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PROTAMINE INSULIN AND ZINC PROTAMINE INSULIN IN THE TREATMENT OF DIABETES MELLITUS*

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It is now nearly sixteen years since insulin was discovered, and in this period the treatment of diabetes mellitus has been changed profoundly. The first stage of this period was occupied in learning how to adopt the use of insulin to that dietetic treatment which had been devised to eke out the diabetic's existence before the introduction of insulin. The second stage saw a less theoretical outlook develop when, as a result of the empirical trial of high carbohydrate diets, physicians were emboldened to adjust insulin to the patient's requirements when taking a more natural diet. The last two years have seen us enter a third stage—the stage in which insulin itself is being artificially modified to meet more effectively the requirements of the diabetic patient.

As yet the protamine insulin preparations have not been widely used in this country, and this is largely due to the commendable caution of the various manufacturers of insulin who refrained from putting on the market, without adequate investigation, modifications of such a vital agent. But very shortly now these new preparations will be available for general use and, judging by past history in therapeutics, it is possible that their general acceptance will be inaugurated by a period of considerable disagreement as to their value. Such a period may be inevitable, but it is to be hoped that it will not delay a just appreciation of the new remedies nor vest them with pretensions which have later to be discarded. The risk of either of these unfortunate possibilities can be minimized if at this time we take the trouble to review the present state of diabetic therapeutics with the object of placing ourselves in a position to decide exactly what improvement in treatment we may expect from the new preparations.

To do this we must begin by considering clearly two questions. What is the object of our treatment of the individual diabetic patient? How far towards this aim does the treatment available to-day carry us? Then, from what is already known of the new preparations, we may try to see how much nearer they can bring us to the attainment of this same object.

The Object of Treatment

At the risk of being trite I shall define the aim of treatment in our individual diabetic patient as the production of a normal sense of physical health and mental well-being. The significance of this definition will become more apparent when it is insisted that no chemical definition of normality, such as freedom from glycosuria or a blood-sugar value within normal levels, can justifiably be taken in substitution. In medicine the ultimate achievement must be measured by clinical not by chemical standards. The diabetic without complications has nowadays the right to feel well; and if he does not do so then treatment is at fault. But patients, with their differing temperaments, have different measures of well-being, and it is necessary that we as clinicians should have some standard by which the vague generalizations of several individuals can be assessed in relatively precise terms. I suggest that a diabetic may be considered to have achieved satisfactory physical and mental health when he has satisfied the following three standards. He must have sufficient energy for his needs; he must maintain his weight about the accepted normal figure for his height and age; and he must not be subject to hypoglycaemic symptoms. Each of these standards is worthy of further consideration.

For a diabetic to feel that he has at his disposal sufficient energy to take again his place in the world with healthy men and women the physician must have dealt successfully with two problems. He must have controlled the physical disability arising from the disease, and he must have sustained the patient to overcome the psychological shock consequent upon the realization that he has diabetes. The latter feat presents varying degrees of difficulty, but the persistence in the lay mind of prognostic standards derived from medical experience before insulin was available still engenders a real psychological factor in each case. There is no weapon so potent against this as the knowledge on the part of the physician that diabetes mellitus, in all save the severest cases, can now be so effectively controlled that the conscientious patient need suffer no disability from his disease; and I would urge the importance of imparting to the patient this conviction and the knowledge of the experience upon which it is based.

In a disease which is characterized by deficient assimilation of certain foodstuffs a knowledge of the variations in the patient's weight provides us with a valuable index of the general effect of our treatment (Himsworth, 1936). When the wasteful excretion of food as glycosuria has been either abolished or restricted, a falling of the weight below the normal standard clearly indicates that the diet is unsatisfactory. But an increase in the weight to an abnormal figure is also unsatisfactory, for such gains presage a breakdown in carbohydrate tolerance. A weight at the normal figure for the patient's age and height should be established and preserved.

It is unfortunate, but it is necessary, that the absence of symptoms from overdosage with insulin must be included as one of the standards of the successful treatment of diabetes. It is undeniable that nowadays many diabetics, especially children, lead lives restricted by the

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fear that symptoms of hypoglycaemia may supervene if they depart from a routine of semi-invalidism. This state of affairs results directly from the imposition on clinical medicine of chemical standards of normality to the disregard of clinical evidence. If chemical signs such as freedom from glycosuria or the restriction of variations in the blood-sugar level within certain limits are elevated to the status of objects of treatment, then on the finding of glycosuria, or an unusual hyperglycaemia, treatment must logically be devoted to its removal, even if this involves the periodic induction of hypoglycaemic attacks. It should be realized once and for all that, with the treatment at present available, there are many diabetics whose blood sugar cannot be maintained within normal limits, whose urine can never be kept consistently free of sugar, without giving insulin in such doses that frequent hypoglycaemic attacks will certainly result and prevent the patient attaining a stable and normal degree of health. To satisfy chemical criteria at the price of such disability from over-treatment is the antithesis of rational therapeutics.

First Stage of Treatment

Hitherto we have been dealing with that final phase of treatment which is concerned with the adjusting of the diabetic to normal health, but we must now consider the preliminary phase in which the patient is being removed from the dangers of the uncontrolled disease itself. In this stage we are dealing with the gross objective evidence of disordered metabolism, and the finer subjective appreciations of health are submerged in the general illness of the patient. It is here that chemistry finds its proper place as a guide to treatment.

To-day there are in use three main tests: estimation of the blood sugar, testing of the urine for sugar, and testing of the urine for ketone bodies. Of the information these provide a knowledge of the presence or absence of ketonuria is immeasurably the most important (Himsworth, 1934a, 1936). Ketonuria indicates that the morbid processes of diabetic metabolism hold sway within the body, and until they are under control, as indicated by the cessation of ketonuria, the diabetic is in danger of being overcome by his disease in its crudest form and dying in diabetic coma. We have two simple tests available for detection of ketone bodies in the urine. The ferric chloride test, which detects these substances only when they are present in quantities which indicate the imminence of coma, and the nitroprusside test, which detects them in minute amounts such as occur in the early stages of balancing and in the severe relapses of the previously balanced patient. Patients in whom the ferric chloride test is positive are medical emergencies and should be treated as such (Himsworth, 1932); patients in whom the ferric chloride reaction is negative but the nitroprusside reaction is positive are in no immediate danger, but are as yet still the subject of grossly disordered metabolism. A more detailed discussion of the significance of these tests and the treatment of the states they reveal is out of place here and has already been given in detail elsewhere (Himsworth, 1932, 1936).

It is regrettable that a knowledge of the blood-sugar level should still enjoy the greatest vogue as the guide to treatment. Based on imposing theoretical considerations it yet survives the practical criticism that it bears little relation to the condition of the patient (Himsworth, 1934a). In my opinion its use is comparable to that of the electrocardiogram. Both are useful in research and in diagnosis; both are superfluous as guides to treatment.

Testing the urine for sugar has lost prestige as a result of the authoritative support accorded to the blood-sugar test. This is unfortunate, as the urine can be made to yield relatively more information than the blood. The finding of glycosuria indicates loss of food in the urine, the testing of specimens passed at different times in the day shows when this waste occurs and points the way to the necessary modification in treatment. If Benedict's test is used the resulting colour measures the concentration of sugar in the urine, and if a sequence of urine specimens are examined the rise and fall of the sugar level in the body is revealed (Fig. 1). Such knowledge permits a much closer control of treatment than do isolated blood-sugar estimations (Himsworth, 1936).

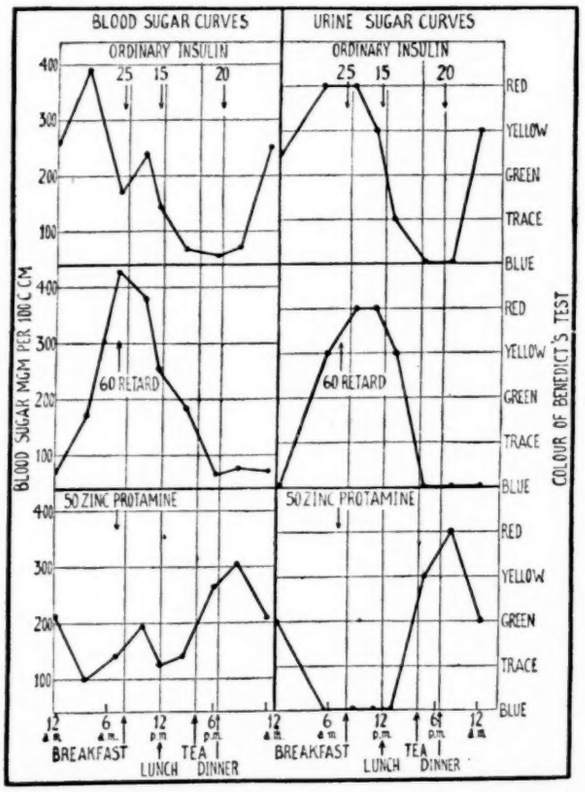

FIG. 1.—Blood-sugar and urine-sugar curves showing the effects of ordinary insulin, insulin retard, and zinc protamine insulin taken from the same patient while on the same diet (Case III). The urine-sugar test is performed by adding eight drops of urine to one teaspoonful of Benedict's solution and boiling briskly for fifteen seconds. After standing for two or three minutes the colour of the test is noted. Red, yellow, and green precipitates and a greenish opalescence (trace) indicate respectively decreasing concentrations of urinary sugar.

We can conclude that the metabolism of a diabetic patient may be considered under control when the urine is always free of acetone bodies and when the waste of glycosuria has been reduced to the minimum compatible with freedom from hypoglycaemic attacks. This control and the attainment of the ultimate objects of treatment can be achieved by the appropriate use of diet and insulin.

Diet

For a considerable time after the discovery of insulin diets greatly restricted in carbohydrate continued to be employed, but the successful trial of higher carbohydrate diets has now resulted in the acceptance of a regime which approximates to that of healthy individuals. The discovery of insulin automatically rendered obsolete the various formulae which were taught for calculating the amount and composition of the diabetic's food intake,

and the realization of this, combined with the acceptance of the modern diets, has permitted a great simplification of treatment.

The calorie value need no longer be calculated, for the amount of food taken by the patient is governed by the weight chart. While it is still a practical advantage to begin balancing a diabetic on a diet in which the amount of food is restricted, the final quantity taken by the balanced patient need only be restricted if he is over weight.

The composition of the diet now advised varies somewhat, but I think it is permissible to say that in this country medical opinion is rapidly accepting a proportion of the order of carbohydrate 2, protein 1, fat 1, so that a 2,000 calorie diet of this type contains about 200 grammes of carbohydrate. Those who are familiar with diets containing 50 or 60 grammes of carbohydrate may raise objections to such a large allowance, but their main practical objection can be anticipated and disproved. Such large allowances of carbohydrate do not necessitate proportionate increases in insulin dosage. Often the dose need not be increased; infrequently a few more units are required (Himsworth, 1934b). The advantages of the new diets are obvious to all who have tried them. It is undeniable that they are more convenient and that they are more palatable. Comparison of the number of admissions to University College Hospital for rebalancing since these diets were used with those of the period in which a low carbohydrate diet was given suggests that they render the patient less liable to relapse. It is probably to the new diets that the disappearance of xanthoma diabeticorum and of diabetic dwarfism can be attributed, while evidence already available encourages the hope that this increased carbohydrate militates against the development of the most fatal complication of diabetes, arteriosclerosis (Rabinowitch *et al.*, 1934; Joslin, 1935; White, 1932). And lastly, but most important they increase the patient's subjective sensations of health and energy. These diets have come to stay, and will supplant completely their older rivals in the treatment of diabetes.

Insulin

Nearly all patients who become diabetic before middle age require insulin within two years of developing the disease; of those in whom the condition appears in later life about one-half come to need it. The indications for the administration of insulin can be stated precisely. It must be given immediately to any patient whose urine contains sufficient acetone to give a positive ferric chloride test; it must be given to a diabetic who, after four days' treatment with a modern diet, passes urine which in the majority of specimens contains enough acetone to give a positive nitroprusside test; it must be given to a patient who, while showing no ketonuria, passes sugar in all specimens after a fortnight's dietetic treatment.

Insulin treatment having begun the dose is systematically increased until the chemical tests indicate that the patient's metabolism is under control and the final objects of treatment are in sight (Himsworth, 1936). We must now consider how far modern dietetics and ordinary insulin will carry us along the path of treatment.

Mild diabetes can be treated successfully with diet alone. More severe cases require, in addition, insulin, in one, two, three, or even four doses a day. The severest cases cannot be completely controlled throughout the whole twenty-four hours. In these latter cases by large and repeated doses during the day the disease can be more or less restrained, but at night, in the absence of further injections of insulin, the abnormal metabolism again reasserts itself. For half the twenty-four hours such cases are virtually untreated diabetics, and by reason of this are prevented from attaining the normal health which less severe cases can achieve (Fig. 1).

This summary of the possibilities of present-day treatment reveals that it is to the transience and the rapidity of ordinary insulin action that in the severer cases of diabetes the obvious shortcomings of our therapeutics can be attributed. The transient effect necessitates multiple doses for cases of any severity, and makes control of the disease difficult if not impossible during the night. The rapidity of action results in the full effect of the insulin injected being manifested within a short time of injection, and thus, by rendering a hypoglycaemic attack inevitable if insulin in excess of the immediate requirements is given, it precludes either the administration of the multiple daily injections as one dose or the control of the diabetes during the night by a large injection of insulin in the evening. It was to meet the needs created by the shortcomings of ordinary insulin that an attempt was made to find a preparation which would have an action at once longer and slower. The production by Hagedorn, after many years of research, of a preparation in which insulin was linked to a natural protamine from fish sperm was the first attempt which was fully successful (Hagedorn *et al.*, 1936). Modifications of the original discovery have since appeared, and the most notable of these is D. A. Scott's preparation containing zinc, protamine, and insulin (Scott and Fisher, 1936*a*, 1936*b*). To avoid confusion we shall refer to Hagedorn's* preparation, protamine insulin, by its trade name of "insulin retard," and to Scott's modification as zinc protamine insulin. The work upon which the following conclusions are based has been carried out in conjunction with Dr. M. R. Thomas at University College Hospital.

Advantages of Protamine Insulins

The slow action of the protamine insulins is seen only after subcutaneous injection. After intravenous injection their action differs little from that of ordinary insulin given by the same route.

In different patients either of the new insulin preparations shows slight variation both as regards duration and speed of action, but of the two the zinc protamine insulin acts more slowly. For the purposes of comparison we may take conditions under which ordinary insulin exerts its maximum effect in two to three hours after injection and is spent at the end of six hours. Insulin retard under such conditions would produce its maximum effect in six to ten hours and have worn off by twelve to eighteen hours. Zinc protamine insulin would show its greatest effect in eight to fifteen hours and be still exerting some action at twenty-four to thirty hours (Fig. 1).

This comparison indicates the respective advantages and disadvantages of the new preparations, and suggests the considerations which must be taken into account when formulating a technique for their administration. The prolongation of action obviously allows reduction in the number of doses, and ensures that the injection of either preparation in the late afternoon controls the disease throughout the night. In the less severe cases, which require one or two daily injections of small amounts of ordinary insulin, the administration of either new preparation in one dose before breakfast will give equally good control. In more severe cases the longer action of zinc protamine insulin permits effective control with a single

* I am indebted to Dr. Hagedorn of Copenhagen and Messrs. Boots Pure Drug Co. for their generous supplies of "insulin retard" and zinc protamine insulin suspensions respectively.

morning dose when insulin retard, with its relatively shorter action, fails to do so (Case III).

The slowness of action by avoiding sudden reduction in the sugar content of the blood minimizes the possibility of hypoglycaemic attacks. This has a great practical advantage in relation to exercise. Exercise, as is well known,

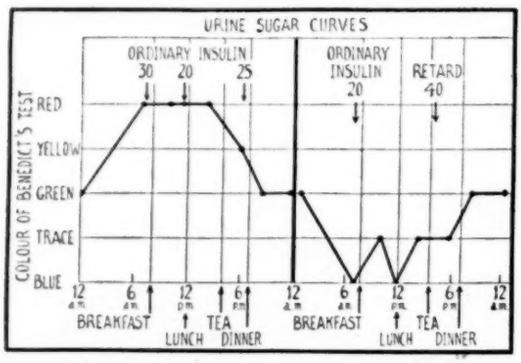

FIG. 2.—Urine-sugar curves from a girl aged 16 years; the first while taking ordinary insulin, the second taking ordinary insulin and insulin retard. The diet was the same in both instances. (Case II.)

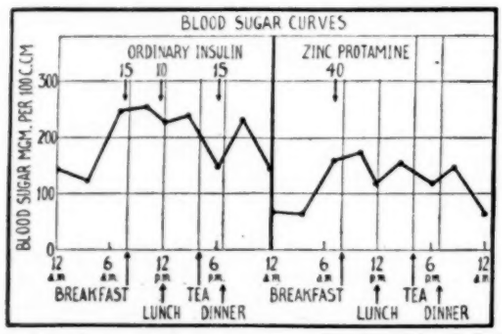

FIG. 3.—Blood-sugar curves from a man aged 65 years; the first while taking ordinary insulin, the second taking zinc protamine insulin. The diet was the same on both occasions. (Case I.)

potentiates insulin action, and any diabetic taking ordinary insulin is liable to precipitate a hypoglycaemic attack by unusual exertion. These slower-acting preparations are less affected by exercise, and hypoglycaemia from this influence is infrequent.

Disadvantages

The very characteristics which constitute the advantages of the protamine insulins also have their drawbacks. The first disadvantage they give rise to is the severity and nature of the hypoglycaemic attacks when they do occur. As a result of the prolonged action hypoglycaemic attacks when untreated last for a considerable time, and administration of sugar may need to be repeated many times to counteract the series of relapses occasioned by the persisting insulin effect. The mild attacks, produced by ordinary insulin and consisting of subjective sensations followed by rapid spontaneous recovery, do not occur, for with protamine insulins the attack, once it begins, progresses to severity. A further unpleasant feature is the suddenness with which severe attacks burst on the patient. The fall of blood sugar produced by the new insulins appears to be so gentle that the warning symptoms of hypoglycaemia are not evoked and the blood sugar slides on unchecked to lower levels, where a severe attack is inevitable. The danger of such attacks is naturally more with zinc protamine insulin than with insulin retard, as the duration of action of the former for more than twenty-four hours favours a summation effect. It is because of these severe hypoglycaemic attacks that one cannot fully utilize this summation effect and give indefinitely large single doses of the protamine insulins in an attempt to enable severe cases to manage with one injection a day. It may be here noted that, as in the case of ordinary insulin, the susceptibility to hypoglycaemic attacks is most marked in the young and least evident in the old.

The second disadvantage is attributable to the slowness with which the protamine insulins come into action. This renders them less efficient than ordinary insulin in restraining the rise of sugar in the body and the consequent glycosuria, following the rapid influx of sugar after meals. It has long been known that the susceptibility of the body to the action of ordinary insulin varies at different times of the day, being least at breakfast, more marked in the evening, and most marked in the middle of the day. Exactly the same variation in susceptibility is revealed by the new insulin. It is for this reason that, in cases of any severity, single morning doses of the protamine insulins are so inefficient in restraining the rise of blood sugar and restricting the glycosuria after breakfast; and it is for the same reason that attempts to remedy this particular inefficiency by increasing the size of the single dose, to amounts which will abolish the post-breakfast glycosuria, may result in hypoglycaemia either during the night or in the middle of the morning, when the body is becoming most susceptible to insulin. Realization of this point has led to the devising of a technique designed to avoid hypoglycaemia whilst restricting post-absorptive glycosuria within reasonable limits.

Technique of Administration

Hagedorn (*et al.*, 1936; Krarup, 1935), using the moderately slow-acting insulin retard, does not attempt to treat any save mild cases with one dose of insulin a day. In the severer cases he gives insulin retard in the afternoon to control the disease in the evening and during the night; and next morning before breakfast he gives a dose of ordinary insulin. This latter by the rapidity of its action controls the glycosuria consequent upon breakfast, and by reason of its transience does not continue acting strongly in the middle of the day when hypoglycaemia is prone to be induced (Fig. 2). The persistence of the insulin retard effect into the next morning ensures that the morning dose of ordinary insulin required is considerably less than if the patient were taking two doses of ordinary insulin a day. If this method proves unsuccessful the diet is modified so that breakfast contains 20 per cent. of the total carbohydrate, lunch 30 per cent., tea 10 per cent., and dinner 40 per cent.

A different technique for zinc protamine insulin has been largely worked out by the Canadian physicians (Rabinowitch *et al.*, 1936: Campbell *et al.*, 1936), and by Lawrence and Archer (1937) in this country. In this the longer duration of action is exploited. One dose of zinc protamine insulin is given before breakfast, and at the same time a dose of ordinary insulin is administered. Mixing of these two types of insulin results in a product whose action is little different from that of zinc protamine insulin, but with care the two solutions can be drawn without mixing into the same syringe and given as one injection (Campbell *et al.*, 1936). The ordinary insulin controls the post-breakfast rise in sugar, and its action has weakened by the time the zinc protamine insulin is coming into full action. For the next six or seven hours zinc protamine insulin is exerting its greatest effect, and thus restraining the rise of sugar following the subsequent

meals. Later, the action still persisting, the disease is controlled during the night. I may add that we have not always found this happy sequence of effects. The development of zinc protamine insulin action may be so long delayed that the full effect of the morning dose does not appear until the evening, with the result that the later meals of the day are inadequately controlled. In such cases the full action of the insulin develops during the night and persists well into the next day, so that the rise in the sugar content of the body following breakfast is suppressed (Fig. 1, zinc protamine insulin curves). A perfect result can be obtained in such cases by giving a small dose of insulin retard, instead of ordinary insulin, along with the zinc protamine insulin.

Principles of Treatment

It is now possible for us to see the indication for the employment of these new insulins, and to formulate, tentatively, principles which should govern their administration.

The protamine insulins are indicated in those cases in which nocturnal glycosuria reveals that ordinary insulin has failed to control the disease during the night; in patients in whom exercise is especially liable to produce hypoglycaemia; and when reduction of the number of daily injections is desired. The principle governing their administration is that the protamine insulins should have as their first object the control of the disease during the night, and only as their second object the restraint of the morbidly exaggerated rises in the sugar content of the body which occur after meals. It is only in mild cases that the new preparations may legitimately be expected to control the disease during the whole twenty-four hours (Fig. 3). In cases of any severity their action should be reinforced by the administration of ordinary insulin at those times when a sudden influx of sugar from the intestine is found to overwhelm their mild action. An analogy may be drawn between the use of the new insulin and a modern technique in anaesthesia. The protamine insulins are comparable to the basal anaesthetics whose effect is both mild and prolonged; ordinary insulin is comparable to the volatile anaesthetic which is superimposed at times when stronger control is required.

Translating these generalizations into practical terms we may say that the dose of protamine insulin should be increased, in accordance with its particular technique, until the urine formed during sleep is free from sugar. If when this has been achieved glycosuria persists, after breakfast an auxiliary dose of ordinary insulin should be given and increased until the urine formed in the second half of the morning is free from sugar. In the present state of our knowledge the danger of hypoglycaemia renders it hazardous to attempt to free from sugar the urine passed in the three hours following breakfast. We should aim at keeping a trace of sugar always in this specimen, and if freedom from glycosuria occurs here the dose of both the new insulin and the ordinary insulin should be reduced until sugar again reappears.

Case Reports

The following cases illustrate various aspects of the use of the protamine insulins.

CASE I

A man of 65 years was admitted with a history of diabetes for four years. He was given a diet of 1,750 calories (carbohydrate 178 grammes, protein 80 grammes, fat 80 grammes), and was found to require insulin. Ultimately he was receiving 40 units a day (15, 10, 15), and yet his disease was not adequately controlled. After three weeks on this diet and this dose of ordinary insulin blood-sugar estimations were made throughout the twenty-four hours (Fig. 3). Doses of 40 units of zinc protamine insulin were then given one hour before breakfast and the same diet continued. After a fortnight of such treatment the second series of blood-sugar estimations were made (Fig. 3). It will be seen that 40 units of zinc protamine insulin adequately controlled the disease. An attempt was then made to substitute 40 units of insulin retard, but this proved inadequate to prevent the rise of sugar in the body during the night.

This patient is an example of those cases which, while too severe to be controlled by one injection of insulin retard, are sufficiently mild to be controlled by one injection of zinc protamine insulin.

CASE II

A girl aged 16 years, who had been treated for diabetes for seven years, on admission to hospital was grossly unbalanced but showed only traces of ketones. She was given a diet of 1,500 calories (carbohydrate 146 grammes, protein 80 grammes, fat 66 grammes) and the insulin was raised until she was taking 75 units a day (30, 20, 25). The disease was not controlled after ten days of such treatment, when the urine-sugar curve in Fig. 2 was obtained. She was then given 20 units of ordinary insulin before breakfast and 40 units of insulin retard at tea-time, and continued with the same diet. The urine-sugar curve after a fortnight of this regime is shown in Fig. 2. She was discharged on this diet and this dosage, but because of hypoglycaemic attacks in the middle of the morning the dose of insulin retard was subsequently reduced to 35 units. She has continued with the same doses of insulin, but the diet has since been raised to 2,000 calories (carbohydrate 208 grammes, protein 80 grammes, fat 94 grammes). For the past year she has been in the best of health, working and playing hard, and has only occasionally passed traces of sugar.

CASE III

A man of 26 years who was found to have diabetes mellitus eleven years ago was treated then with insulin and a low carbohydrate diet. His insulin requirements gradually rose and he came to take 50 units a day (25, 0, 25). Two years ago he was given a diet of 1,750 calories (carbohydrate 178 grammes, protein 80 grammes, fat 80 grammes), and this necessitated no increase in insulin dosage. An acute infection in the autumn of 1936 unbalanced him, and in January, 1937, he was admitted for rebalancing.

In hospital he was given the same diet and the insulin was raised to 60 units a day (25, 15, 20). On this dose of insulin some of the urine specimens became sugar-free for the first time. After ten days of this dosage the blood-sugar and urine-sugar curves marked "ordinary insulin" (Fig. 1) were obtained. He was then changed to 60 units of insulin retard one hour before breakfast. The same diet continued to be given. After ten days on this diet the blood-sugar and urine-sugar curves, marked "retard" (Fig. 1), were taken. The insulin retard was then replaced by 60 units of zinc protamine insulin, given one hour before breakfast, but two days later the occurrence of a severe hypoglycaemic attack, in the middle of the morning, necessitated a decrease of dosage to 50 units. After one week on zinc protamine insulin the curves thus labelled (Fig. 1) were obtained.

This case illustrates several points. With ordinary insulin the sugar content of the body rose in the late evening and during the night; with insulin retard this rise was delayed to the early hours of the morning; with zinc protamine insulin the nocturnal rise was abolished, and the only evidence of escape of the disease from control was in the late afternoon and early evening when, that day's dose of insulin not yet being in full action, the action of the previous day's insulin was waning. It is noteworthy that while taking ordinary insulin acetone appeared in the urine during the night. While taking the protamine insulins it was absent. The speed with which the different insulins come into action is also demonstrated by this case, ordinary insulin acting quickly,

insulin retard moderately so, and zinc protamine insulin being relatively delayed.

Shortly after the last test shown in Fig. 1 the man had a hypoglycaemic attack just before breakfast. The dose of zinc protamine insulin was dropped to 40 units. As it was feared that this reduction would permit much sugar to escape during the morning, 10 units of ordinary insulin were given along with the zinc protamine insulin. The patient was discharged on these doses and now appears to be satisfactorily controlled.

REFERENCES

Campbell, Fletcher, and Kerr (1936). *Trans. Ass. Amer. Phys.*, **51**, 161.
Hagedorn, Jensen, Krarup, and Wodstrup (1936). *J. Amer. med. Ass.*, **106**, 177.
Himsworth, H. P. (1932). *Lancet*, **2**, 165.
—— (1934a). Ibid., **2**, 888.
—— (1934b). *British Medical Journal*, **2**, 57.
—— (1936). *Treatment in General Practice*, **2**, 338. H. K. Lewis and Co., London.
Joslin (1935). *The Treatment of Diabetes Mellitus*. Lea and Febiger, Philadelphia.
Krarup (1935). *Clinical Investigations into Protamine Insulinate*. Gad, Copenhagen.
Lawrence and Archer (1937). *British Medical Journal*, **1**, 487.
Rabinowitch *et al.* (1936). *Canad. med. Ass. J.*, **35**, 239.
—— Ritchie, and McKee (1934). *Ann. int. Med.*, **7**, 1478.
Scott and Fisher (1936a). *J. Pharm. Exp. Therap.*, **55**, 206.
—— —— (1936b). *J. biol. Chem.*, **114**, 88.
White (1932). *Diabetes in Childhood and Adolescence*. Lea and Febiger, Philadelphia.

NON-SURGICAL RENAL EMERGENCIES

A POST-GRADUATE LECTURE

BY

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It would be an unprofitable exercise to attempt in one lecture an exhaustive survey of what I have called the non-surgical emergencies of the kidney. Suffice it, then, to recall that though there are rare conditions such as paroxysmal haemoglobinuria and less rare ones like the renal crisis of tabes dorsalis, which are independent of any abnormal condition of the kidneys themselves, the great mass of the subject is concerned with some serious anomaly of the function of these organs.

Starting with the kidney itself in a state of disorder, or with some developmental abnormality, or perhaps a constitutional weakness in the general vascular system which renders it incapable of standing up to the progress of "wear-and-tear," we may arrive at substantially the same end-result. That end-result may take on a multiplicity of forms which we group under the term "uraemia." It may be that uraemia is the most natural termination of life that we know, but at the same time in the face of every emergency, medical or surgical, that arises in practice we should ask ourselves the question: "Ought this to have come about or were we in a position to prevent it?" Acute illnesses such as a pneumonia or a fulminating appendicitis we will always meet without having had any forewarning of their approach, but there are other conditions of emergency which are recognizable in their pre-emergency stage—a stage that ought never to be far from our minds.

The boundary between the pre-emergency and the emergency involving the function of the kidneys is so ill marked that it is easy to lose sight of it altogether, but its clinical recognition, by which I mean the bedside recognition, is so important that I stress it. For it is generally easier to modify the life of an individual so as to bring it within the compass even of a grossly impaired kidney function than to persuade a completely arrested kidney to take up its role again.

Illustrative Case No. 1

Take the case of a woman who has passed the allotted span of years. She has suffered in the last few years from a good deal of headache and pain about the back of the neck; her eyesight is not very good, she is breathless, and she has signs of aortic leakage without the large heart of the "aortic" patient in the prime of life: her aortic valve is the seat of that slow sclerosing endocarditis which we know to be associated with some degree of granular kidney. We are called to see her and find her breathless, but there is no obstruction to the breathing; the respirations are long and deep; there is a hyperpnoea rather than a dyspnoea. She has been unable to sleep for a few nights, the skin is hot and dry, there are many moist rales all over the chest, and she has passed no more than a few ounces of urine during the last twenty-four hours.

She is within sight of acute uraemia. How is she to be treated? Complete withdrawal of all food, abundant water to drink, a warm room and many blankets on the bed, and a large compress of antiphlogistine over the loins are the immediate indications and may achieve a very striking transformation; but the relief of such a condition is at best only temporary: her kidneys are permanently impaired and secondary changes elsewhere are already established.

Illustrative Case No. 2

Here is a very different picture, where a situation which appeared desperate was fortunately got over, with, in all likelihood, little or no damage to the kidneys.

A woman of 43 is troubled with oedema of the legs during the last weeks of her first pregnancy, but no changes are found in the urine. An hour after her successful delivery she has an eclamptic fit and the urine is found to contain much protein. In the next three days the amount of albumin steadily diminishes to little more than a trace, when it begins to rise again and she becomes very breathless. She is admitted to hospital on the tenth day post partum. She is very ill: the pulse 108, the respirations 44 per minute, and the temperature 98.4°; she coughs much and brings up a purulent spit. She is flushed, with a slight cyanosis, there is much oedema of the legs and back; there is a nasty burn on the dorsum of the left foot, a relic of the fit. The urine becomes almost solid on boiling, the blood pressure is 174/88. The breath sounds are loud and harsh with many rales, mostly dry. A large needle is inserted into a vein in front of the elbow and a few ounces of dark viscid blood are withdrawn, but clotting in the needle is so rapid that the vein is exposed by dissection and a cannula inserted. The cannula too is quickly blocked, and in all not more than eight ounces of blood have been drawn and a like quantity of saline infused.

Next morning the patient is in a parlous state. A few more ounces of blood, not so dark and thick as on the previous evening, are aspirated by syringe, more perhaps as a salve to the conscience than anything else. The woman, rather stout and plethoric, is literally struggling for breath, but seems to get a measure of relief from oxygen administered by intranasal catheter. She is coughing incessantly and bringing up much frothy sputum, and there is a dusky cyanosis in spite of the oxygen. Her distress is explained by an examination of the chest; there

is a widespread acute oedema of both lungs, and it is clear that fluid is accumulating in the air channels more rapidly than it is being got rid of. She looks likely to die. Most of us are dubious regarding the use of morphine in the presence of impaired kidney function, but Sir William Osler was a strong advocate of its employment in uraemia, and no one could say that Osler favoured short-sighted enthusiasm. I compromise, giving this patient 1/20 grain of apomorphine hydrochloride hypodermically. Ten minutes later she is reported to be in a more desperate state than ever, restless and delirious, but in the next hour or two she loses no more ground. In fact the quality of the pulse seems to improve a little and she is getting rid of her copious spit with a little less effort. Four hours after the first dose the apomorphine is repeated, and again in a few minutes she becomes notably confused. In the course of the afternoon she is given an enema of an ounce of magnesium sulphate, two ounces of glycerin, and three ounces of water, better known in the surgical wards as a flatus enema, but a preparation well adapted to rid the body of a large amount of water by the bowel. This is a really drastic measure, which I only commend to your notice in the case of a water-logged patient who is not too exhausted. At 7 p.m. a third dose of apomorphine is given, and I am at least hopeful that our patient is not in such danger of drowning as she was in the morning. At 10 p.m. it is clear that all other ends must be sacrificed to the necessity for sleep, and 1/4 grain of morphine with 1/100 grain of atropine is administered. In the course of the night she gets a few hours' uneasy sleep, and has further doses of apomorphine at 2 a.m. and 6 a.m. Twenty-four hours have seen a striking improvement: cyanosis is less, the pulse is 84, the respirations have dropped from 60 the previous afternoon to 36, coughing is less insistent, the lungs not so full. The enema is repeated in the afternoon, the apomorphine at 6 p.m., the morphine at 9 p.m., and the apomorphine again at 3.30 a.m. Thereafter a satisfactory convalescence sets in, the bowels being kept active with jalap powder and magnesium sulphate by the mouth. During the first few days of this illness there has been incontinence, so that the amount of urine passed is difficult to state.

You will have noted that the patient was very oedematous, and I attribute some of our success in the elimination of water to the presence of the burn on the dorsum of the foot, an area of roughly twelve to fifteen square inches, which literally poured out water for several days. The mental disturbance shown in this case deserves a note. There is no doubt as to an access of confusion after each dose of apomorphine, but an equally striking disorder was a complete amnesia as to the events of a whole week before her admission to hospital, this amnesia persisting up to her discharge six weeks later.

Illustrative Case No. 3

A woman of 59 had a breast removed for cancer seven years ago, and as yet there is no recurrence. She has been subject to infrequent attacks of asthma, relieved by expectorants. She is taken ill with an attack of diarrhoea, with some pain in the chest and a pleural rub. Her temperature rises to 102°, there are moist sounds in the right lung. She perspires very freely for the first few days of this illness, and then the skin becomes dry and she passes but little urine. During the seventh day she passes no urine, but the bowels still tend to be loose; there is slight fever and she is becoming drowsy. In the evening she shows some mental confusion, she complains of headache, the blood pressure is 150/80, the breathing is embarrassed, the optic disks show a heightened colour. Three hours later she is only semi-conscious and has become restless and rather noisy; she does not recognize a familiar face or voice. A few ounces of blood are, with difficulty, drawn from a vein in the arm. It is thick and dark. At 1 a.m. she is given 1/20 grain of apomorphine. At 4.45 a.m. she is so noisy that 1/4 grain of morphine is given. At 10 a.m. she is almost comatose, but there is considerable resistance as I insert a spinal needle. She has passed a stool containing much blood in shreds, the skin is dry, the breathing difficult, and her pallid face reflects that slaty-grey cyanosis which we so dislike to see. The apomorphine is repeated, and the next two hours see some hopeful perspiration, but an hour later she is once more dry, restless, and noisy. Oxygen is being delivered by the nasal catheter, and again she is quieted with 1/4 grain of morphine. In the evening, barely conscious, she is able to swallow 3 drachms of the syrup of chloral, and the loin pack of antiphlogistine is applied. At 11.15 p.m. apormorphine, at 2.50 a.m. morphine, and in the morning she is to all appearance *in extremis*—we actually note that curious delineation of the nasal cartilages which always seems to say that a fatal issue is not far distant. At 10.45 a.m. I return to the apomorphine, and instruct that it be given every four hours, or sooner if she should again become restless, and that nothing else be given.

Twenty-four hours later she is conscious but wildly confused. She recognizes her husband, she recognizes myself, and when I offer her ice-cream she roundly abuses me for having withheld that delicacy so long. She is now coughing and has a free expectoration, and during the day she takes abundant water. A bromide and chloral sedative in the afternoon, 3 grains of soneryl at night, and next morning her confusion is lessening. Sleep on the following night is appreciably aided by 1½ drachms of paraldehyde, and the mental condition is now clear, she is passing a satisfactory amount of urine, the systolic blood pressure has dropped to 134, and the acute uraemia may be said to have been weathered. Here, too, there was a retrograde amnesia of about five days antecedent to her admission to hospital.

Nitrogen Retention

I come now to an observation in these two cases on which I have so far laid no stress—the blood urea. We are accustomed to think of this estimation as a chapter in the modern development of blood analysis, but the first note on increased nitrogenous retention in chronic nephritis came from the collaborators of Richard Bright himself more than a century ago. It remained to their successors to show that urea could be fed to the body till its concentration in the body fluids was equal to that seen in uraemia without causing symptoms of that disorder. It follows, then, that a high blood urea is not diagnostic of uraemia, and that we are not better placed in the matter of diagnosis when we have our colleagues of the laboratory at our immediate call than when we are dependent on our own unaided faculties. Uraemia is a syndrome which is recognizable at the bedside, be it in the clinic, the castle, or the croft. It is really after the condition has been recognized that the degree of nitrogenous retention should be estimated, for it does go some way to tell us what kind of kidneys we are dealing with, what hope there is that we can induce them to take up their proper role again, what likelihood of our patient resuming, if not a normal life, at least a life of modified usefulness.

"Uraemia"—A Note of Caution

We do not know with certainty how the symptoms of uraemia are determined, and I would warn you against the view that this is but a name for the terminal features of a chronic nephritis. We speak of chronic uraemia and acute uraemia, and we recognize that a patient with the former is in danger of the latter; but whether it be the sudden maniacal seizure, the onset of convulsions, or the rapidly developing coma, these emergencies are so distinctive of the acute condition that it would seem proper to limit the term "uraemia" to this group, and to regard the chronic as the pre-uraemic phase—a phase which has much in common with the acute disorder, but in which some further factor responsible for the catastrophe must, on the face of it, be lacking. Scarcely a single feature has been demonstrated in a case of uraemia, but it has been shown to be present in a patient who was not suffering from uraemia. The cerebral symptoms have been widely attributed to the very constant oedema of the brain which is found at necropsy, but oedema of the brain is also found in patients who have not to our knowledge had uraemia. So it is with the findings during life: this patient with uraemia has 100 milligrammes or more of urea in 100 c.cm. of blood; this one with the same concentration of urea has no uraemia. The toxaemia of eclampsia, even when it introduces a picture which outwardly cannot be separated from uraemia, is not attended by any appreciable rise in the blood urea, 42 mg. having been found in the patient I have described to you. The second patient showed 95 mg. at midnight and 125 at 10 a.m., undoubtedly an evil prognosis. And yet, in a most readable chapter on diseases of the kidney, Boyd (1931) cites a case where a man injured in an accident had complete suppression of urine for a week and a blood urea rise to 200 mg. without the least suggestion of uraemia in his condition.

Emergencies cannot be provided to meet a pre-arranged occasion. I have sought, therefore, to show you to the best of my ability one or two word-pictures of illustrative cases met with in the last year or two, but it would be misleading to confine my remarks to instances on which we can look back with some satisfaction. Here is a canvas of different hue.

Illustrative Case No. 4

A boy of 6 is seen in the out-patient department in August, 1935, on account of constipation and loss of appetite; a few moist sounds are noted in the chest, a common enough finding, and many such are admitted to the children's sanatorium. One day in September he is noted to be a little puffy under the eyes and there is a trace of protein in the urine, but a week later this has gone and he remains clear. Towards the end of November he has a slight cough, and again there are rales in the chest and a trace of albumin in the water. During the last week of the month his mother notices that his gums appear to have been bleeding in the morning, and for three days his motions have been black and he has complained of a sore head. Then he vomits a large quantity of blood, and he is brought into hospital. On the next day he has a small epistaxis; there is cough, but no adventitious signs in the lungs. A little albumin is found in the urine; he is pale, and has a considerable secondary anaemia. Two days later he becomes very restless and talkative. There is no fever; he develops a squint and has double vision. Then he becomes hemiplegic, and falls to the weakened side when he sits up. The cerebro-spinal fluid is not under pressure. Next morning convulsive movements of the limbs lead up to a deepening coma, and this little patient dies. An hour or two before the end the spinal theca is tapped again, and the pressure within is seen to be more than normal. Subsequent analysis of the fluid reveals a urea content of 274 mg. in 100 c.cm. Too late we noted that though his urine showed no tube casts he was passing more than healthy kidneys should need to pass. This boy had a narrowing of his urethra, probably developmental in origin; the bladder and ureters were widely dilated, the kidneys shrivelled and shrunken, completely played out. I draw from this case the reminder that no age is exempt from uraemia, and that oliguria is not a necessary precursor of its onset.

Attempts at Clarification

Nine-tenths or more of our present-day knowledge of nephritis we owe to the master who first described it: Bright's disease is still Bright's disease. Over a full century one or another, clinician or anatomist, has tried to clarify our conception of the disorder by this or that terminology, to pigeon-hole, as it were, the various clinical entities or anatomical pictures which we meet, only to find that the partitions between the pigeon-holes are as broken as the kidneys they contain. Uraemia can occur in every form of the disease, the concominant of every type of inflamed or degenerated kidney that we know, and there is no denial that with a long history of nephritis, a long losing battle against the failing excretory powers of the body, the advent of this syndrome finds us helpless. Yet we do less than our duty if we throw in our hand too soon; we must play it out to the last trick every time. For there are cases of uraemia which can rightly be regarded as crises in the life of the human machine, and which may, with fortune's favour, be got over.

Now a word from Richard Bright (1836):

"The first circumstance which strikes the mind is the extent and frequency to which the derangement of one organ is connected with the derangement of several others; yet we are not at liberty to assume that the disease of the kidney has been the primary cause on which the disease of the rest depended. It may be that some other organ has first suffered, and that the kidneys, together with the rest, have become involved. I confess I am inclined to believe that the kidney is the chief promoter of the other derangements. The only organ except the kidney which I think, on taking a review of the history of this disease, might probably act as the primary cause, is the skin; and this is so closely connected in its derangements with the kidney that the relation of their lesions, as regards cause and effect, becomes equivocal. . . . In almost every case the first impression which brings on the anasarca is suppression of perspiration. . . ."

This reference by Bright to the skin as a possible factor in the causation of nephritis is of some interest, for it is in the management of the disease rather than in the causation that the skin has been the subject of most attention. In point of fact we reached the anomalous position, which we still retained up till twenty years ago, that though we ignored the skin in our views of the aetiology, except in cases following extensive burning, we gave it pride of place in the treatment. We are more consistent to-day; gone are the hot packs, ousted by the radiant-heat bath until an unhappy patient, perspiring freely, came into contact with a bad insulation and was electrocuted; but the hot pack has never regained its once honoured place—honoured perhaps by ourselves alone, for it had long been damned by the nursing profession. So for a moment I

should like to examine this drift of our thoughts and practice relative to the part played by the skin in the uraemic state.

Maintenance of the Water Balance

The body is provided with four channels of elimination: the kidneys, the bowel, the lungs, and the skin. Reflection will show that of these the skin at least has no true excretory function at all, the elimination of water by this channel being really subservient to the necessary provision of a means for cooling the body. The normal water balance of the body ranges about an income of 2½ litres per diem. Of this 1½ litres are excreted by the kidneys, 1/2 litre, in the proportion of 4/5 and 1/5, by the lungs and the intestine, the remaining 1/2 litre being earmarked, as it were, for the use of the skin. If, under identical conditions of work and temperature, extra water is taken in the excess is got rid of by the kidneys. The normal kidney is able to maintain a substantial increase in water elimination for a long time, but if, by feeding with water, that capacity is worked up to its maximum possible, renal failure will set in. At this moment we are all eliminating water by our skin at a rate corresponding to half a litre in twenty-four hours. Although this is called insensible perspiration it does not denote any activity on the part of our sweat glands; it is not a slow sweating, but a process of osmosis and evaporation. If, however, the temperature of this room were to be raised our rate of water elimination would gradually increase to a point when we would begin to show visible perspiration, the secretion of sweat having been shown to begin in health when the body temperature reaches a height of 0.2° to 0.5° C. above normal (Kuno, 1930). Normal sweat has a specific gravity of 1003; it is the most dilute of all the body fluids. In other words, the sweat glands are designed to respond to any need of the body for increased evaporation, and not to nitrogenous surfeit. Even in the absence of visible perspiration we recognize that some skins are dry and some moist without subjecting our observations to precise measurement. Our hands, not our eyes, tell us that the patient with Graves's disease has a moist skin, and that he with uraemia is dry, even though his subcutaneous tissues may be literally a bog.

The Skin in the Uraemic State

In the later stages of sclerosis of the kidney the amount of real kidney tissue available for the bodily needs is but a fraction of the normal. The resulting failure is in part qualitative and in part quantitative. In the first place the kidney is unable to concentrate urea; in order, therefore, to excrete urea it has to exercise its faculty for excreting water to its utmost ability. But this, as I have said, is a limited faculty even in a healthy kidney; how much more restricted, then, in contracted kidney? So the unequal battle goes on; large amounts of water may be eliminated for a time, with ever-increasing difficulty, until the kidney is on the point of complete arrest. At this stage the lungs may excrete a watery sputum, the large bowel initiate a diarrhoea, but the skin remains inert. It seems as though the water were more urgently held elsewhere, either in the maintenance of osmotic balance or in excretory channels whereby it may relieve the body of nitrogenous waste. This is a condition in which the body cannot afford to sweat, for it is essential that any water leaving the tissues should carry with it its quantum of waste. At its best the skin is still parsimonious in its output of solids, even though it be profligate in expenditure of water. We know that it is often difficult to induce sweating in uraemia, but that, having seen it established, we ascribe the patient's ultimate recovery to our success. My own impression is that when the patient is ready to sweat—that is, when, the abnormal claim of other tissues on the water stores of the body having in some way abated, water is again available for the skin—then, and only then, he will sweat. The dry skin of uraemia only eliminates water when it is no longer dry. If, then, your patient is showing evidence of elimination by the lungs or bowel do all you can to aid the action of these organs and leave the skin alone. Keep him reasonably warm, watch for the first appearance of moisture on the skin, and then, if you will, apply your packs and your poultices. If there is no sign of tentative excretion by any of the accessory channels your patient will die; he is probably the subject of a widespread poisoning, the nature of which we do not yet know. There are two types of acute uraemia: in one the kidney has failed for the time being, but the subsidiary paths of elimination are capable of tiding over the crisis while the kidney undergoes a measure of recovery; in the other the poison is so far-flung that nothing we can do is of the least avail.

Conclusion

I have covered a bare tithe of the ground of uraemia, a fraction of chronic Bright's disease. We are tempted to ask if this patient with convulsions or coma, this one with nocturnal asthma, and this man with an obstinate dyspepsia are subjects of one and the same disease. Yet we recall other conditions which, alike in their origin, are as far apart as the poles in their appearances. Two men are suffering from parenchymatous syphilis of the central nervous system. One, a paretic, comes to you wearing, maybe, the cloak of a Pan-European dictator, maybe the motley of a genial clown; the tabetic retains his intellectual poise to the last. Look back for a moment: at some time in our childhood we were interested in the bewildering succession of patterns we saw in a kaleidoscope. Yet each little coloured component preserved its own shape through all these variations, and the plaything of a forgotten afternoon may have its counterpart in some of these fascinating problems of to-day.

BIBLIOGRAPHY

Boyd (1931). *Pathology of Internal Diseases*, p. 433.
Bright (1836). *Guy's Hosp. Rep.*, **1**, 360, 394.
Kuno (1930). *Lancet*, **1**, 912.
Osler: *Principles and Practice of Medicine.*

The trustees of the Ella Sachs Plotz Foundation for the Advancement of Scientific Investigation received ninety-two applications for grants during 1936, thirty of which were approved, including one continued annual grant. Eighteen of the new grants were awarded to scientists in countries other than the United States. Among those receiving grants were Dr. Melville Arnott of Edinburgh, for research into the connexion between renal damage and hypertension. The annual report of the Foundation states that during the present great need for funds grants will be given in the sciences closely related to medicine without reference to special fields, the maximum amount being as a rule 500 dollars. There are no special forms of application, but letters asking for aid must state the qualifications of the investigator, the nature of the proposed research, the size of the grant requested, and the specific way in which the money is to be expended. Applications, which should include letters of recommendation from the directors of laboratories and clinics in which the work is to be done, should be sent to Dr. Joseph C. Aub, Collis P. Huntington Memorial Hospital, 695, Huntington Avenue, Boston, Massachusetts, before May 1.

TREATMENT OF ASPIRIN POISONING BY INTRAVENOUS SODIUM LACTATE SOLUTION

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Aspirin, or acetyl-salicylic acid, is formed by the action of acetic anhydride upon salicylic acid. It is not a completely stable substance, and samples often have the odour of acetic acid. In the commercial preparation certain impurities may be present in the form of ortho-creosotic acid and acetic acid, as well as free salicylic acid.

A solution of aspirin yields a buff-coloured precipitate with ferric chloride. In the presence of free salicylic acid a violet colour is formed, although the colour due to a small amount of salicylic acid can be masked by the addition of tartaric, citric, or other oxyacids. The limit of free salicylic acid has been suggested as 0.2 per cent. in the tablet form (Martindale and Westcott, Vol. 2).

Large single doses are usually required to produce symptoms of intoxication, and very large doses may be fatal. A patient recently reported by A. V. Neale (1936) recovered with intensive treatment after taking 500 grains (32.4 grammes), and a patient of S. C. Dyke's recovered with treatment after taking 435 grains (28.8 grammes) (Dyke, 1935). Dyke also quotes from the literature a series of fatal cases: Hitche's patient, who died after taking 1,000 grains (64.8 grammes); five cases of Janoviche's, in whom the average fatal dose had been about 500 grains (32.4 grammes); and a series of cases studied by Balázs, who considered the minimum fatal dose to be in the neighbourhood of 450 to 600 grains (29.8 to 38.9 grammes).

We have found no mention, however, of the dose which may prove fatal in children. One child whose case we are here reporting was 14 months old, and took a dose of about 30 grains (1.944 grammes), which would probably have proved fatal but for intensive treatment.

Poisoning may also occur where salicylate is administered therapeutically in divided doses. M. Odin (1932) reports fourteen cases in which poisoning occurred after doses of 90 grains (5.8 grammes) a day, and two cases in which only 45 grains (2.9 grammes) per day were administered.

Metabolism of Aspirin

The solubility of aspirin in water is very slight—only 1 in 400—and the rate of hydrolysis is minimum in a neutral solution. It is markedly increased by the presence of acid or alkali. Martindale showed that the percentage hydrolysis in water after four hours was only 2.9 per cent.; in 0.2 per cent. hydrochloric acid it was 4.7 per cent. Thus hydrolysis with physiological acid is very slight, which means that the amount split up while passing through the stomach does not exceed 5 per cent. of the total amount taken. The bulk of the ingested aspirin is decomposed by the alkaline intestinal juices to salicylate, while a small amount is absorbed unchanged as aspirin, and may be excreted in this form. The total excretion in the urine of ingested salicylate is normally between 60 and 75 per cent. The total excretion of unchanged aspirin varied from 8 to 36 per cent. in a series investigated by Hanzlik (Martindale and Westcott, Vol. 2).

Potassium citrate increases the water solubility of the aspirin, two volumes of potassium citrate rendering it soluble 1 in 20 (Martindale and Westcott, Vol. 1). When prescribed with potassium citrate "there may be a notable difference in physiological effect, as apart from the independent action of the potassium citrate the speed, and even the locus of absorption in the system, may give enhanced effect. A larger proportion may perhaps be absorbed in the stomach, and in consequence less would be carried forward to the duodenum, where alone aspirin is thought to be assimilated." Sodium bicarbonate has a similar action in hastening the decomposition of aspirin and leads to the formation of acetate and salicylate of sodium. These pharmacological factors have an important bearing on the treatment of aspirin poisoning. For example, a stomach wash-out will probably be of value only if performed within the first hour or two after the ingestion of the aspirin, when the bulk of the aspirin has not yet passed on to the duodenum. Also, the oral administration of sodium bicarbonate as an antidote, which is so popularly favoured, is contraindicated in the early stage when the absorption of aspirin may be increased.

Clinical Picture

The clinical features of aspirin poisoning may best be described by the report of a case from the literature. S. C. Dyke's patient (1935) was a woman who recovered after taking 435 grains (28.8 grammes). In the first few hours of illness the main symptoms were nausea and buzzing in the ears. During the night she appeared to be mentally confused, and became deaf. Next day she became stuporous, disorientated, and extremely restless, and resisted all interference. Severe vomiting produced dehydration, but sweating was not specially noted. Her respirations were deep and slow, and she presented the picture of acidosis, the urine showing acetone by Rothera's test and a deep purple colour with ferric chloride. This latter reaction was out of proportion to the amount of acetone present, and was best explained by the probable presence of aspirin in the urine. Visceral damage was indicated by the presence in the urine of bile salts and traces of urobilin. The urine also reduced Fehling's solution. Treatment consisted mainly in the administration of fluid and glucose by the bowel and mouth, and in repeated lumbar punctures, which appeared to have a very beneficial effect. By the third day the patient had improved, although she was still drowsy and complained that her head felt large and that her vision was blurred. She made a complete recovery.

A. V. Neale (1936) described a patient who rapidly developed symptoms after taking 500 grains (32.4 grammes) of aspirin. Vomiting occurred after two and a half hours, and four and a half hours later she became semi-comatose. She was very pale and sweated profusely, and her respirations were quick and shallow, later becoming deeper. The alkali reserve in this patient was 40 volumes per cent. (the normal is from 50 to 60 volumes per cent.). Treatment consisted chiefly of a stomach wash-out and lumbar puncture. In twenty-four hours there was improvement, but she complained of deafness and tinnitus. A reactionary pyrexia up to 100° F. (38° C.) followed forty-eight hours later. The urine was free from salicylic acid four days after admission.

Report of Patients at the Children's Hospital, Melbourne

CASE I

A male infant, 14 months old, was admitted to the Children's Hospital, Melbourne, under the care of Dr. Stewart Ferguson, at 4 p.m. on September 16, 1936, with the history that two and a half hours previously he had eaten six or

seven aspirin tablets—that is, at least 30 grains (1.944 grammes). Half an hour later he had vomited white frothy material freely mixed with pink blood, and the vomiting had been repeated three or four times. He was now looking a little paler than normal, but was otherwise well. At 6 p.m. he had a temperature of 98.5° F. (36.8° C.), a good pulse of 128, and the respirations of 28 per minute were quiet and easy. When seen again at 11 p.m. he was sitting up and looking very wideawake, but seemed quite comfortable, with a good pulse and colour. During the night his respirations increased in frequency and depth, and he became agitated and noisy, passing a sleepless night. Five ounces (142.1 c.cm.) of 10 per cent. glucose and saline were taken orally by the child. When seen next morning he showed extreme mental and physical restlessness and great thirst. He drank liberal amounts of fluid, but most of it was vomited. His respirations were rapid and gasping, at 56 per minute. Circulatory depression was present, the pulse being 162 per minute and of very poor volume, and the child's colour was slightly grey and cyanotic. He was also dehydrated and hollow-eyed. A specimen of blood was taken from the superior longitudinal sinus through the anterior fontanelle for an estimation of the alkali reserve, which was 22 volumes per cent. The temperature was 102° F. (39° C.). His general condition rapidly became worse and the respiratory distress was greater, making the outlook extremely grave.

A continuous intravenous infusion of a buffer solution of isotonic sodium lactate, as described by Hartmann (1934), was commenced, and 15 ounces (85.6 c.cm.) were run in by the slow-drip method. This was followed by 30 ounces (170.52 c.cm.) of 10 per cent. glucose and saline solution. Two units of insulin were given four-hourly with the glucose. Chloral hydrate and potassium bromide, 4 grains, were administered as a sedative, and large amounts of sodium bicarbonate solution and glucose were given by mouth.

Two hours after the intravenous solution had been running his general condition commenced to improve. His colour and circulation were better, and the respirations, though deep and rapid, were less distressed. His temperature remained elevated, and he fell into a light, restless sleep. By the next morning he had become peaceful, and the respirations, while remaining rapid, were shallow and easy. Another estimation of the alkali reserve showed that it had risen to 55 volumes per cent. On the following day the alkali reserve had fallen again to 38 volumes per cent., but the general improvement was sufficiently established to allow the intravenous infusion to be discontinued.

From the third day until the tenth day he continued to vomit several times daily; he was looking pale and sick, running an irregular temperature, and losing weight. The urine showed occasional hyaline and granular casts. The alkali reserve on the seventh day was 42 volumes per cent. From the tenth day onwards he commenced to improve and to gain in weight, and became a normal cheerful baby once more, making a complete recovery.

There are many interesting features in this case on which we should like to comment. There are several symptoms in common with those seen in adult patients, such as the vomiting, mental restlessness, thirst, dehydration, and respiratory changes. The long latent period may be very misleading in assessing the seriousness of the intoxication. There is also the very critical level of 22 volumes per cent. to which the alkali reserve had fallen; this is the lowest figure we have seen reported in literature in which recovery occurred.

With regard to treatment it would have been advisable to wash out the stomach in spite of the fact that copious vomiting had occurred. The dose of sodium lactate solution required to raise the alkali reserve 25 to 30 volumes per cent. is 10 c.cm. of the molar sodium lactate per kilogramme of body weight diluted with five volumes of distilled water (Williams and Panting). We can find no previous record of the treatment of aspirin poisoning with this solution.

Discussion

It is of interest to consider what is the pathological and biochemical basis underlying these clinical manifestations of profound toxaemia in aspirin poisoning. A necropsy of the case described by Andrew Wyllie (1935) revealed blood in the stomach and petechial haemorrhages on the serous surfaces of the lungs and heart. The kidneys were in a condition of glomerulonephritis, and the liver showed fatty degeneration. Paisseau, Friedmann, and Vaille (1934) describe the anatomical changes as being discrete in the case of the kidneys, but of great intensity in the liver, which was in a state of fatty degeneration. The anatomical changes are well established, but the mechanism of the production of the clinical syndrome is not so universally agreed upon.

Almost everywhere in the literature salicylate poisoning has been regarded as an acidosis due to poisoning by the acid radical, either that contained in the salicylate itself, the view most commonly held, or by some other acid formed in the body as a result of disturbed metabolism, a view held by Balázs (1930). In 1928 opposition had been raised by Veil and Graubner against the view that salicylate poisoning was due to an acidosis, and more recently by Martin Odin, who regards the symptoms of deep respiration as being due to a specific toxic action of the salicylate on the respiratory centre.

As early as 1882 Quincke described the hyperpnoea so frequently found in salicylate poisoning, and regarded it as being due to the action of the acid radical on the respiratory centre. This was again regarded as being analogous to the deep breathing found regularly in the acidosis of diabetic coma. Further support for this conception is the fact that there is always a fall in the alkali reserve of the blood. Also, it is thought that a favourable result could be observed from the administration of sodium bicarbonate. G. Paisseau notes further points in favour of this interpretation in the acidity of the urine with a constantly lowered *p*H, the resistance to alkalinization, and the raised ammonia excretion.

Veil and Graubner base their opposing theory partly on certain theoretical calculations showing disproportion between the fall of the alkali reserve and the quantity of salicylic acid ingested. They regard the deep breathing as due to a specific action on the respiratory centre.

Martin Odin (1932) compares the biochemical findings in salicylic intoxication and diabetic coma. He finds in the first instance an average alkali reserve of 38 volumes, a salicylic acid content of the blood of about 0.3 gramme per litre of blood, the *p*H of the blood being normal or slightly raised. In diabetic coma where deep breathing was present the alkali reserve was usually about 26 volumes, the total acids in the blood 0.75 gramme per litre—double the amount of salicylic acid—and the *p*H of the blood lowered. He draws the conclusion that the salicylic acid must be considerably more toxic than diacetic acid, seeing that the symptoms of poisoning in diabetic coma arise only when the content of the latter acid in the blood is considerably higher. And so one can hardly speak of salicylic poisoning as an acid poisoning pure and simple; it is a more specific toxic action.

Investigation of a second child treated at the Children's Hospital, Melbourne, for aspirin poisoning lends support to the view of a specific action of salicylate on the respiratory centre, at least in the earlier stage of the toxic effect.

CASE II

A girl, aged 2 years and 8 months, swallowed approximately 60 grains (3.89 grammes) of aspirin, and it was not until twelve hours later that her parents became worried

about her condition. At first irritable, while mentally very alert, with rapid breathing and fits of screaming, she was admitted to hospital twenty-four hours after the ingestion of the aspirin. Her clinical picture, with deep rapid respirations 48 per minute, flushed face, and vomiting, was compatible with a diagnosis of acidosis; yet this was not confirmed by investigation. The alkali reserve was 50 volumes per cent., and the urine gave negative reactions to Gerhardt's and Rothera's tests. The treatment given was 8 ounces (227 c.cm.) of 2 per cent. glucose and saline solution intravenously, and 1 pint (568 c.cm.) of 10 per cent. glucose and 0.9 per cent. sodium bicarbonate solution orally during the first twelve hours. The child's breathing remained deep, and the rate was 40 per minute; she was still irritable. The alkali reserve had fallen to 29 volumes per cent. and the urine gave positive reactions to Gerhardt's and Rothera's tests, showing that a state of acidosis had developed.

Twenty-six ounces (738 c.cm.) of sodium lactate solution and 17 ounces (447 c.cm.) of 10 per cent. glucose and saline solution were given by the slow-drip method intravenously in twenty hours, the patient showing considerable improvement. She was able to take a normal light diet, and appeared quite well after a further three days.

Conclusion

In our cases the weight of evidence seems to be in favour of the intoxication being possibly a toxic action on the respiratory centre, but chiefly due to an acidosis. This is borne out by the rapid improvement in the clinical condition which accompanied the rise in the alkali reserve following the administration of sodium lactate solution. Odin (1932) warns us to be careful in using salicylate in nephritic patients. In two of his cases already quoted albumin was present in the urine before treatment was commenced, and both patients developed symptoms of poisoning with so small a dose as 45 grains a day. All of his cases had a moderate number of red blood cells in the urine, five had albuminuria, and two had some casts. This, considered with the necropsy findings of acute nephritis, indicates that it is difficult for nephritic patients to excrète salicylic acid.

Summary

1. A survey of the reported cases of aspirin poisoning is given, showing that large doses are necessary in adults to produce toxic effects.

2. Alkalis increase the absorbability of aspirin.

3. Two infants, who developed severe toxic symptoms after the ingestion of 30 grains (1.944 grammes) and 60 grains (3.89 grammes) of aspirin respectively, are described; both recovered after sodium lactate (Hartmann's solution) had been injected intravenously.

4. It is considered that the toxicity of aspirin is due to an acidosis, and possibly to a direct action of salicylic acid on the respiratory centre.

ACKNOWLEDGEMENTS

We wish to thank Dr. Stewart Ferguson for permission to publish the reports of these patients.

We are greatly indebted to Miss Splatt of the Walter and Eliza Hall Institute, Melbourne, whose estimations of the alkali reserve served as a valuable guide to treatment; to Dr. Bolton, medical superintendent of the Royal Melbourne Hospital, who supplied us with the sodium lactate solution; and to Dr. Ian Wood for his advice and assistance.

REFERENCES

Balázs, J. (1930). *Med. Klinik*, **26**, 1664.
Dyke, S. C. (1935). *Lancet*, **2**, 613.
Hartmann, A. F. (1935). *Arch. int. Med.*, **56**, 413.
Martindale and Westcott (1928). *Extra Pharmacopoeia*, 19th ed., 1, 75.
Ibid., 19th ed., 1929, **2**, 15f.
Neale, A. V. (1936). *British Medical Journal*, **1**, 109.
Odin, Martin (1932). *Acta med. Scand.*, Supp. **50**, 177.
Paisseau, G., Friedmann, E., and Vaille, C. (1934). *Bull. Mém. Soc. méd. Hôp. Paris*, **50**, 1201.
Quincke, H. (1882). *Berl. klin. Wschr.*, **19**, 709.
Wyllie, A. M. (1935). *Lancet*, **2**, 768.

CONTINUOUS INTRAVENOUS SALINE INFUSION

BY

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Continuous intravenous saline infusion is now being used more extensively in this country; unquestionably it has helped to save many lives. We feel that a time has been reached when it would be well to review its advantages, to try to enumerate its indications and contraindications, and particularly to dwell upon the dangers connected with its use.

Indications

1. *Dehydration* from any cause, such as starvation, vomiting, diarrhoea, or excessive sweating.—In acute intestinal obstruction the combination of continuous gastric aspiration and continuous intravenous saline infusion both before and after operation is a marvellous therapeutic advance.

2. *Prevention of Post-operative Shock.*—A typical indication is at the close of the operation of partial gastrectomy, especially when it has been performed on a poor subject.

3. *Shock.*—Here we appear to have a helpful method of combating shock. In these cases we have added one ampoule of coramine to each pint of saline solution with advantage. French observers have reported favourably on the results of adding adrenaline to the solution in doses of about 5 minims of 1 in 1,000 solution to each pint.

4. *Diabetic Coma.*—This is probably the best method of introducing large quantities of glucose and insulin, a measure which is so necessary in this condition.

5. *Post-operative Thyrotoxicosis.*—It has long been recognized that a copious fluid intake is beneficial in these cases. If administered early enough continuous intravenous saline infusion will often tide the patient over a crisis. If hyperpyrexia and other signs indicate that the patient is being flooded with the toxin, the injection of 50 minims or more of Lugol's solution into the delivery tube, associated with the application of an ice-pack to the limbs and precordial region, and, above all, the employment of an oxygen tent, is the best possible course to adopt in these anxious, but now fortunately rare, catastrophes.

6. *In profound jaundice, after the obstruction has been removed*, it is often remarkable how quickly the jaundice clears when continuous intravenous saline treatment is administered (see also Contraindications).

7. *Septicaemia.*—That benefit accrues from continuous intravenous medication in septicaemia is not generally agreed. In our experience in some cases continuous intravenous saline therapy, by diluting the circulating toxin and stimulating the excretory activity of the kidneys, appears to have done good. The addition of a capsule of intravenous mercurochrome to each filling of the reservoir definitely has done no harm, and we believe that in several cases of septicaemia it has helped the patient to combat the infection.

8. *As a Convenient Means of Inducing Evipan Anaesthesia.*—In cases of perforated peptic ulcer we give the patient continuous intravenous saline infusion while the theatre is being made ready. With the saline solution still dripping into the vein the patient is brought to the theatre. The abdomen is opened under local anaesthesia. As soon as the peritoneum has been reached a small dose of evipan is introduced into the rubber tubing of the saline apparatus, and evipan flows into the vein together with the saline solution, which has been turned to a steady flow. The anaesthesia produced by the evipan gives ample time for the performance of the operation. The infusion before and during the operation mitigates shock, and the absence of a general anaesthetic helps, in a large measure, to prevent a major complication of treated perforated peptic ulcer—pulmonary involvement.

9. *Continuous Intravenous Sodium Sulphate in Oliguria and Anuria.*—Providing that in obstructive cases the cause of the anuria has been removed, continuous intravenous saline, or, what would be better still, continuous intravenous sodium sulphate, are diuretics without a peer. I. L. Dick found that in every case the diuresis produced by intravenous sodium sulphate was greater than that produced by sodium chloride, and in no case was there any evidence of storage of sodium sulphate in the body. An isotonic solution is made by dissolving 42.85 grammes of Glauber's salt in one litre of water. We have used this solution in a variety of cases of anuria, oliguria, and "latent" uraemia. Needless to say, in cases where there is a mechanical obstruction to the outflow of urine this must be first removed. Some of the patients were actually moribund. In only one instance did it fail to produce diuresis, and that was in a case of polycystic disease of the kidneys which at the post-mortem examination showed no evidence of any renal tissue remaining. We generally give only one or one and a half pints of this solution daily; during the rest of the twenty-four hours normal saline solution is employed. There is no reason for limiting the dosage to this amount other than timidity on our part.

Contraindications

1. *The Failing Heart.*—A history of dyspnoea on exertion, uncompensated valvular disease, or any possibility of cardiac weakness should call for hesitation in increasing the bulk of circulating fluid. When the integrity of the heart muscle is suspected a physician should be consulted before employing continuous intravenous saline infusion.

2. *Pulmonary Congestion.*—In all conditions where there are signs of oedema or consolidation of the bases of the lungs the method is inadvisable.

3. *Hypertension.*—If the blood pressure is high it is obviously courting danger to burden the circulation still further. Essential hypertension and the sthenic form of uraemia with convulsions are especially mentioned as contraindications, for in these cases some degree of cerebral oedema may be present.

4. *Bright's disease* in all its stages is a grave contraindication. In advanced uraemia, where Bright's disease is a possible underlying cause, venesection, one pint, followed by continuous intravenous sodium sulphate, one to one and a half pints, may be tried. The same precaution of preliminary venesection and cautious replacement of circulating fluid should be taken in all cases of chronic bilateral pyelonephritis. Polycystic disease is a definite contraindication.

5. *In Obstructive Jaundice where the Obstruction has not been Removed Completely.*—Death is hastened by this measure, as was observed in one of our patients where the obstruction was due to carcinoma of the common hepatic duct. At the post-mortem examination the kidneys were deeply stained and choked with bile.

Preparation of the Solution

Obviously a solution which is introduced directly into the circulation must be absolutely sterile, but this is not enough. It must also be free from dead bacteria and other extraneous matter such as fur from the sterilizer. Boiled tap-water does not fulfil these requirements, and if it is used reactions are bound to occur. Triply distilled water must be employed in all cases. Although the Pharmaceutical Society is less stringent in its regulations we have made it a rule that distilled water more than a week old is discarded. With a view to this flasks are stamped with the date of preparation.

It is, of course, equally important to have the sodium chloride sterile and pure. Tablets sold in tubes for the preparation of normal saline are not prepared with a view to intravenous therapy. Sterile ampoules for making a 5 per cent. solution of glucose are readily obtainable; it would be an advantage to have similar ampoules of sodium chloride.

In fully equipped institutions the whole of the work of preparing the saline solution can be undertaken by the dispensary staff. At the Royal Northern Hospital flasks of sterile saline solution prepared by the dispenser with newly triply distilled water are supplied on demand to the wards. Periodical bacterial examinations are made in the pathological laboratory.

Saline or Saline and Glucose?—Normal saline solution alone meets most requirements. It has two outstanding advantages over glucose or combined saline and glucose. First, it causes less chemical phlebitis and thrombosis, and secondly, it is manifestly physiological. When glucose is employed we are introducing a substance into the circulation which requires katabolism, and in our opinion if glucose is to be used there should be adequate reasons for its introduction; the patient must be in need of glucose, as one who has been starved, and only sufficient glucose for his immediate needs should be introduced by the intravenous route. A 5 per cent. solution of glucose in six pints of saline contains about 180 grammes of glucose, so at the usual rate of flow the patient is receiving 720 calories in the twenty-four hours. This may be increased if no other source of nourishment can be utilized by the patient. As regards insulin, if there is no reason to think that there is a deficiency in this hormone there is no reason to give more.

Technique

Inserting a Needle or Cannula.—It is not always necessary to cut down upon a vein; a small nick in the skin and the insertion of a special hollow needle (Fig. 1)

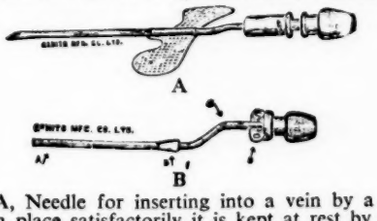

FIG. 1.—A, Needle for inserting into a vein by a puncture. Once it is in place satisfactorily it is kept at rest by a strip of adhesive plaster across each flange. B, Cannula for use when vein is too inconspicuous for a needle to be inserted. This is made in two sizes, for adults and children.

is equally effective in many instances. A vein in the forearm is usually chosen. It is a great mistake to choose the most prominent vein. One which is easily palpable but well obscured and supported by subcutaneous fat will

be found to be less mobile, and thus more readily entered. The large prominent veins of the aged are notoriously difficult to enter, and in these cases it is as well to transfix the vein transversely with a fine needle before carrying out the puncture. When the veins are small and difficult to locate, if time permits it is useful to soak the arm in a hot bath for fifteen minutes before attempting the puncture. When it is necessary to cut down upon a vein a small transverse incision is used. If no veins can be seen an incision should be made over the commencement of the internal saphenous vein. Even in a new-born infant we have never failed to find this just anterior to the internal malleolus. There is no need to dissect out a vein with the point of a scalpel; blunt longitudinal dissection by opening the jaws of a small haemostat (Fig. 2) is more efficient and saves time.

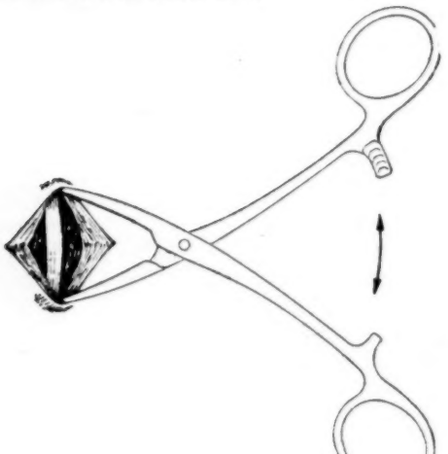

FIG. 2.—A rapid and efficient method of displacing a subcutaneous vein through a small transverse cutaneous incision.

Splinting the Arm.—A posterior plaster strip well padded with gamgee with a turn around the wrist forms an ideal splint readily adapted to each individual patient.

Splinting the Leg.—There is no better method than Thomas's knee splint, as described in a previous article.

The Temperature of the Fluid

In spite of the many ingenious devices which have been invented for keeping the fluid warm we are still of the opinion that the simplest is the best—namely, the patient's leg or arm into which the saline solution is flowing should be kept warm with a hot-water bottle or a Q-pad. In addition to simplicity this leaves the reservoir and the delivery tube in full view.

The Administration

The actual administration is largely in the hands of the nursing staff. It is of paramount importance to be sure that the nurse appreciates the simple yet vital responsibilities connected with the care of the apparatus and the maintenance of strict asepsis. The nursing instructions are really very simple, and can be carried out by any conscientious State-registered nurse, providing that if she has not been trained in the method she receives special instructions. With the help of a competent nurse there is no reason why continuous intravenous saline solution should not be administered to a patient in a private house, as contrasted with a fully equipped hospital.

Nursing Instructions

1. Every portion of the apparatus must be freshly boiled and washed through with sterile water or saline solution before the reservoir is filled. New rubber tubing should be boiled, stretched, and washed through to remove chemicals before the apparatus is assembled.

2. Every utensil used in the transfer of the saline to the reservoir must be absolutely sterile (Fig. 3).

3. To prevent the entry of bacteria from the air the top of the reservoir must be covered with sterile gauze.

4. The reservoir must always be kept more than half full of saline solution.

5. The patient's limb into which the solution is flowing should be kept warm with a hot-water bottle or Q-pad.

FIG. 3.—Replenishing the reservoir.

6. The average rate of flow is fifty drops per minute. This should be timed at frequent intervals. Fifty drops per minute is about a quarter of a pint per hour—six pints in twenty-four hours.

7. If the flow stops: (*a*) do not pinch the tubing; (*b*) see if the tubing is kinked; (*c*) if the flow is not restarted by some simple adjustment of the limb or the tubing report the matter at once.

8. Watch for and report immediately: (*a*) rigors; (*b*) redness along the vein; (*c*) oedema of the feet, face, or arms; and (*d*) any sign of respiratory distress.

9. Measure the amount of urine the patient has passed. If the output is less than the intake report the matter. Also report if the specific gravity becomes low.

Special Instructions for the Medical Officer

1. If the patient does not appear to be responding take the blood pressure. Intravenous saline infusion should not be continued in the presence of a falling blood pressure.

2. Especially after forty-eight hours watch the bases of the lung for signs of oedema.

3. Watch the urinary output, paying particular attention to the specific gravity.

4. Unless there are definite indications to the contrary there is seldom need to continue the flow after the third day. A good working rule is to remove the needle or cannula at the end of seventy-two hours and if necessary to reinsert it into another vein after six or twelve hours.

5. If the flow stops do not dissemble any part of the apparatus without due thought of the possibility of air embolism. Rather remove the needle or cannula, and if necessary reinsert it into another vein.

6. In some cases, especially when glucose is employed, redness and tenderness appears along the course of the vein. This is hardly ever anything more than a chemical phlebitis, which soon settles down after the flow into that vein has been discontinued.

Conclusion

A patient who is ill enough to warrant this form of therapy needs watchful care and attention. The continuous administration of saline solution intravenously does not therefore add materially to the nursing or medical attention which such a patient requires.

The advantages of this over other methods of administering saline solution are great; the rate of flow and the amount of fluid given can be regulated with mathematical precision. Like all good things the principal evil lies in its abuse, and the most obvious danger is oedema. It should be realized that it is not until about eight pints of fluid have collected in the tissues, a quantity equal to the volume of the circulating blood itself, that the sign of pitting on pressure becomes manifest. It would be a very great help if there existed some simple test which would indicate when the patient had received sufficient fluid and that more would be harmful. At the present time the only choice lies between an estimation of the plasma protein, which is far too complicated and time-consuming for general application, and the rough-and-ready method of charting the output of urine and its specific gravity in one column and the intake of all fluid in the other (see table). Providing that reasonable care

*Continuous Intravenous Saline Balance Sheet**

24 hours ending	Intake		Output	
		Pints		Pints
	At 50 drops per minute		Urine { S.G. a.m. / S.G. p.m. }	
	,, 30 drops per minute		Vomitus	
	,, drops per minute		Normally 1¾ pints { Faeces	
	By mouth		Sweating and lungs, say	
	Total		Total	

* Pads of these charts can be obtained from the G.U. Manufacturing Co., 28A, Devonshire Street.

is exercised the latter is enough for practical purposes. A balance sheet of fluid loss and intake should be drawn up. For loss of fluid by sweat, lungs, and normal defaecation a total of one and three-quarter pints has to be calculated. To this is added the urine output plus vomitus if necessary. From this total the maintenance dose for the next twenty-four hours can be calculated.

REFERENCES

Bailey, H., and Carnow, J. M. (1934). *British Medical Journal*, **1**, 11.

Baudouin, A., Lewin, J., Bérnard, H., and Sallet, J. (1935). *Paris méd.*, **1**, Suppl., 569.

Dick, I. L. (1934). *Edinb. med. J.*, **41** (Med.-Chir. Soc. Trans.), 203.

Smith, G. G. (1935). *Canad. med. Ass. J.*, **33**, 262.

Walther, W. W. (1937). *Lancet*, **1**, 6.

CLIMATO-PHYSIOLOGICAL INVESTIGATIONS AT THE SEASHORE*

BY

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For nearly two hundred years convalescent children have been sent to the seaside, and it is generally known that this treatment is successful. When, as a physiologist, I began to study the curative power of the seashore I remembered that pharmacology had greatly increased the efficiency of drugs by modern methods of experimental study. In recent years many investigations have been made upon children at the small seaside town of Wyk on the island of Foehr, on the German side of the North Sea, where there are two large children's homes belonging to Berlin and Hamburg, and a great number of smaller homes for convalescent children under national insurance. The town built a small laboratory for us and the insurance organizations made a grant of some money. Dr. Häberlin, who has practised in Wyk for more than thirty years, and other local medical men, were associated with me in this investigation.

Physiological Effects of Climate

Medical climatology makes a true distinction between climates that are stimulating or "bracing" and those that are sheltered or "sedative." But a stimulating climate, so called, includes both the stimulus of the solar heat, which we do not feel so bracing, and the ultra-violet rays of the sun, which we do not feel at all. Obviously climatic stimuli of all kinds—of the sunshine, wind, cold air, or rolling breaking waves—operate upon the body through the skin, and it is true also that it is by means of the skin that the human body controls its temperature-regulation by changing the size of the capillaries at different external temperatures.

The observations which formed the basis of our work may be summarized as follows:

1. There is a very rapid reaction of the capillaries (Häberlin, Kestner, *et al.*, 1923), both dilating and contracting, in healthy children living at the seaside.

2. In pale, weakly, and undernourished children, damaged by town life and sent by health officers or doctors to the seashore, the same reactions occur, but they are slower and weaker. We found that these children, not protected by immediate reactions, lose many calories, and that the temperature of the body falls considerably after the shortest sea-baths, even in August, and even whilst merely playing on the seashore. Such children cannot at first tolerate sea-bathing, but during the cure the capillaries gradually recover their normal "gymnastic" function. The circulatory reactions improve week by week, and the same children who felt "terribly cold" and cried at their first bath could play later on in the open air without clothing, even in stormy weather. The time and completeness, or otherwise, of the reaction can be determined and measured, and these measurements are very helpful in checking the degree of exposure and the recovery of health. This behaviour of the cutaneous circulation explains an observation of Curschmann. He found that healthy young men, mostly students, had the same systolic blood pressure after sea-bathing as before, but that in patients with contracted blood vessels (arterial hypertonus) the blood pressure was lowered after a sea-bath. For this reason he called the seashore "the paradise of the hypertonic."

* Abstract of a lecture given to the Kensington Branch of the British Medical Association, October 16, 1936.

† The reference to Dr. Carl Häberlin's address, reported in the *British Medical Journal*, August 22, 1931 (p. 331).

3. Respiratory reactions. It is a familiar fact that putting the feet in cold water is answered by deep breathing. The cool air and the continual breezes of the seashore deepen the respiration and change the form of the chest (Häberlin and Krauel, 1933).

4. It has been demonstrated that exposure to bright sunshine raises the content of haemoglobin in undernourished anaemic children (Häberlin, Kestner, *et al.*, 1923, and Häberlin and Krauel, 1933). When we began our investigation the children had dinner at midday and rested or slept after dinner for two or three hours. The best hours of the day, therefore, were spent indoors, and play on the seashore was only possible in fair weather. At that time we found a striking parallelism between the duration of sunshine and content of haemoglobin (Häberlin, Kestner, *et al.*, 1923). We then altered the scheme of daily life in the convalescent homes, and so arranged it that children could spend the time out of doors, even on days with only brief intervals of sunshine. The weather changes often and suddenly on this island. At the present time the children play out of doors for hours, even in winter, and for half an hour, twice daily, without clothing. This they do with enjoyment even in the snow. When we repeated our previous determinations we could not find any relation between sunshine and haemoglobin.

It is one of the important practical results of these investigations that all these homes are now open throughout the year. The doctors in charge now consider that the best results are obtained during the winter (Häberlin, 1928). These observations agree with the experience at Berck-sur-Mer. It is evident, therefore, that ultra-violet rays cannot be the one and only active factor in the sea climate. Häberlin found the proportion of ultra-violet rays in summer and winter as 330 to 1.

5. The stimuli of the seashore increase human metabolism. The astonishing extent of this increase, both at marine and Alpine stations, and indeed as produced merely by exposure of the body to the open air, has been demonstrated by Sir Leonard Hill. We studied the effects of exposing children and adults to the sun and air and found that the oxygen consumption was higher in the sunshine than in the shade (5–1.1). A rise could be observed if we exposed only the face and hands, but it was higher if the rays of the sun could touch the whole body. Artificial light, so rich in ultra-violet rays, does not produce the same reaction. This effect of the sun-bath is, however, at once lost if the body becomes heated, for the processes of oxidation (for example, in the liver) are diminished by heat. Thus is explained one of the principal advantages of the seashore as compared with other health resorts—namely, the great stimulation of metabolism—for the incessant movement in the atmosphere has great cooling power and prevents disturbance of this stimulation by neutralizing the effects of solar heat.

6. An increasing metabolism is the best criterion of a stimulating climate, both in the Alps and on the seashore. It is always connected in children with a retention of nitrogen. During the summer and winter we have had boys aged 6 to 8 under our care. Before arriving at Wyk they spent ten or fourteen days in the clinic of the University Hospital in Hamburg on a diet containing calories, proteins, vitamins enough for maintenance, and they excreted in urine and faeces about the same quantity of nitrogen as they obtained in their food. These children were then brought to one of the convalescent homes in Wyk, accompanied by the same nurse, and were put on exactly the same diet. We found that the excretion of nitrogen was lowered from the third to the last day of a month, so that a daily retention of 0.6 to 1 gramme of nitrogen could be observed, equivalent to 400 to 6[illegible] grammes of new living tissue. Physiology does not sho[illegible] any considerable storage of proteins in the body; retentio[illegible] of nitrogen must signify the building of new tissues an[illegible] growth. The sea climate, therefore, enables the huma[illegible] body to grow and build up tissues on the same die[illegible] which in a good hospital, where the children spend [illegible] good part of the day in the garden and play and live [illegible] the same way as by the sea, does not allow retention o[illegible] nitrogen. During a further period spent by these childre[illegible] in Hamburg no retention could be observed. In anothe[illegible] group of boys, who lived in the hospital as far a[illegible] possible in the same way as on the seashore, and wh[illegible] were exposed daily to artificial ultra-violet rays, there wa[illegible] also no retention.

7. This retention of nitrogen is in full accordance wit[illegible] Häberlin's determinations of the body weight of group[illegible] of children who lived for ten months of the year i[illegible] a city and for two months at Wyk-on-Foehr. Body weight and haemoglobin went up at the seashore and dropped or did not increase when they were in the city. The whole life-history of these children looks on the charts like a staircase. The circumference of arms and legs increased by growth of the muscles; the circumference of the abdomen decreased (Häberlin, Kestner, *et al.*, 1923, and Hering, 1925).

8. A further important influence of the seashore i[illegible] increased gastric secretion, observed at Wyk by Maria Braun. In both adults and children she found the hydrochloric acid and total acidity figures after the usual test meals higher than in Hamburg. The increased appetite of people during their stay by the sea or on board steamers is probably connected with the rise of gastric secretion, but it is not easy to give a physiological explanation of this rise of acidity as in the case of the fall of blood pressure by the improved reaction of the capillaries. My investigation could not be finished, so no explanations can be offered.

Conclusion

Most of our investigations are made on children—pale, weak, convalescent children. It seems to be a rule that healthy, vigorous persons have very slight reactions to differences in climate. They are not greatly disturbed by changes of environment. A full measure of adaptability is a symptom of perfect health. That may be the reason why many climatologists studying the influence of climates on themselves or on their friends and comrades have found surprisingly minute reactions.

The stimuli of the seashore are sun, air, water, winds and waves. We do not at present know any others. These stimuli exist only in the open air; not in the room of a hotel or a convalescent home. This enables the medical man to control the dose. Undoubtedly the complex must be different in different health resorts, and even in different parts of the same health resort. Modern biology tells us that every living being elects the stimuli of its environment according to its ability to be influenced by them. The living man is the instrument for investigations in medical climatology. It appears that two climates can be very different for the meteorologist and nevertheless have the same influence upon our patients.

BIBLIOGRAPHY

Berger, Käthe (1933). Thesis, Medical Faculty, Hamburg.
Braun, Maria (1935). Thesis, Medical Faculty, Hamburg.
Häberlin, C. (1928). *Winterkuren an der See: Therapie in Einzeldarstellungen*. Leipzig, Thieme.
—— Kestner, O., *et al.* (1923). *Klin. Wschr.*, **2**, 2020.
—— and Krauel, G. (1933). *Die Kur an den deutschen Seeküsten*. Hamburg, Carl Griese.

Hering (1925). Thesis, Medical Faculty, Hamburg.
Kestner, O. (1928). *Veröff. Zent. Balneol.*, New Series, No. 7.
—— (1935). Dr. Häberlin's *Handbuch der Meeresheilkunde*, 43. Berlin and Vienna, Urban und Schwarzenberg.
—— Dannmeyer, Fr., Peemöller, Fr., and Plaut, R. (1923, 1925). *Klin. Wschr.*
—— Johnson, Carl G., and Laubmann, W. (1931). *Strahlentherapie*, **41**, 171.
—— Peemöller, F. R., and Schadow, H. (1927). *Pflugers Archiv*, **217**, 473.
—— and Schadow, H. (1927). Ibid., **217**, 492.
Krauel, G. (1932). *Veröff. Zent. Balneol.*, New Series, No. 32.
Meier, Fritz (1935). *Balneologie*, 2 year, 399.
Never, Henry E. (1933). *Strahlentherapie*, **49**, 381.
Schadow, H., and Roeloffs, F. (1932). *Monats. f. Kinderheilk.*, **52**, 50.

Clinical Memoranda

A Sporadic Case of Encephalitis Lethargica

In the island of Jersey the condition of encephalitis lethargica is almost unknown. This case presented unusual difficulty of diagnosis, which prevented its early recognition, as will be easily appreciated from the report; there seems, however, no reasonable doubt as to its correctness.

Case Record

A female, aged 33, first came under observation in 1930, when she had a large pyonephrosis on the right side. Nephrectomy was performed, with uninterrupted recovery; on examination the tumour revealed only fibrous tissue and pus, no renal substance remaining. The patient complained of some frequency of micturition, particularly nocturnal, after the operation.

In 1931 the frequency of micturition called for treatment because the patient had to rise from nine to twelve times a night. No marked physical signs were apparent; the urine was acid, with a trace of albumin and some pus cells; bacilli of the *coli* group were present. Hexamine was given, with some improvement.

In 1934 frequency of micturition, which had never completely disappeared, again became very troublesome; and as it resisted medical treatment and bladder lavage she elected to go to London, and was admitted to the Westminster Hospital under the care of Mr. Arthur Evans. Cystoscopy revealed some ulceration of the bladder and cystitis; the left urethral orifice was enlarged and the bladder capacity small. Intravenous pyelography showed normal filling of the renal pelvis and ureter, and no sign of stone. Hexamine was administered and bladder washes with silver nitrate and oxycyanide of mercury given, but the urine remained as reported above. The patient was placed on a ketonic diet without any marked result. Treatment with the *B. acidophilus* was likewise unattended with improvement, and the patient returned to her home.

She was then given intravenous injections of cylotropin 5 c.cm. every other day, ten injections in all, with marked benefit, nocturnal frequency being reduced to three times in the night. Treatment was discontinued, and the patient remained in this state for about two years.

On October 5, 1936, the patient again presented herself, this time complaining of headache and drowsiness. Examination revealed no physical signs, and the condition was regarded as uraemic. No pyrexia was present; she was placed on a suitable diet and given diuretics; she continued to work in her home. October 10: drowsiness and headache increasing, patient liable to go to sleep anywhere and at any time; she also complained of blurring of vision—examination of the optic disks revealed nothing. Urea concentration test gave a negative result, and the blood urea was found to be 41.5 mg. per 100 c.cm. This, of course, upset the diagnosis of uraemia.

The patient continued to get gradually worse. An examination of the cerebro-spinal fluid gave 0.02 per cent. protein, cells, mainly lymphocytes, 1 per c.mm., and a few red blood cells. On October 31 she took to her bed with increasing lethargy and somnolence. The temperature, which had been irregularly subnormal, suddenly rose for a few hours to 103° F., only to fall and remain at its previous level. Further careful examination showed no physical signs other than very doubtful bilateral Babinski plantar reflexes. She now exhibited a change of character; from being a very reserved and shy woman she showed a tendency to indecent conversation and exposure.

November 11: muscles of deglutition becoming paralysed; progressive difficulty in swallowing solids; incontinence developing largely because "she cannot be bothered." November 15: severe haemorrhage occurred from the vagina, and persisted for about forty-eight hours. November 16: patient became comatose. November 17: death supervened in the state of coma.

Commentary

The outstanding features of this case were: (1) headache, which was persistent and mainly frontal; (2) lethargy, which was at first associated with somnolence and later with insomnia; (3) dimness of vision; (4) complete absence of physical signs.

The difficulty of diagnosis was in the main due to her previous renal history. Unfortunately permission for a post-mortem examination could not be obtained.

St. Helier, Jersey. J. J. W. EVANS, F.R.C.S.

Haemolytic Streptococcal Meningitis Treated with Prontosil : Recovery

I believe the following case of streptococcal meningitis successfully treated with prontosil is worthy of record.

Case Report

A boy, aged 9 years, was admitted to hospital on October 6, 1936, with the signs of acute meningitis. The child had marked neck rigidity and a positive Kernig's sign, and was complaining of pain in his back. On admission his temperature was 101.8°, pulse 128, respirations 28. The child was very thin and looked neglected. The history was that he had not been well for two weeks, and had a discharging ear. Lumbar puncture was performed; the cerebro-spinal fluid was clear but under a pressure of 220 mm. C.S.F. No abnormalities were found in the cerebro-spinal fluid except for a slight reduction in the chlorides to 680 mg. The physical signs increased, the pyrexia persisted, and lumbar puncture was repeated three days later. The fluid was now turbid and under increased pressure. Mulford's polyvalent anti-meningococcal serum was given intrathecally and intravenously. The cerebro-spinal fluid was sent to the Birmingham University laboratory for examination, and beta-haemolytic streptococci were reported in pure culture.

Anti-meningococcal serum was repeated intravenously the next day, with no reduction of temperature. On having the report of the presence of streptococci, prontosil was administered on October 13; 10 c.cm. was given intramuscularly daily and two tablets by the mouth three times a day. After thirty-six hours of treatment with prontosil the temperature became normal. Lumbar puncture performed on October 16 and 20 yielded thick pus, and beta-haemolytic streptococci were again reported in pure culture. Three doses of 20 c.cm. of anti-scarlatinal serum were also given intravenously, but not until after the temperature had returned to normal. Prontosil was continued for eight days. The patient continued to improve, and by November 5 there was no head retraction, but Kernig's sign was still positive. A week later the child appeared perfectly normal and had no Kernig's sign. By the end of November the child was up and has remained perfectly well.

I am indebted to Mr. E. S. Clayton, M.D., F.R.C.S.Ed., medical superintendent of the hospital, for permission to record this case.

CHRISTIA F. LUCAS, M.B., Ch.B.,
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Reviews

THE NATURE OF CANCER

Principles and Foibles of Cancer. Research in Regard to Etiology and Nature. By William Rienhoff, sen., M.D., F.A.C.S. (Pp. 200.) Baltimore: Waverley Press. 1936.

That Dr. William Rienhoff's book is no ordinary medical treatise may be judged from the fact that its bibliography of 611 items includes ten references to the Bible, eleven to the works of Goethe, and others to Horace, Schiller, Kant, Einstein, and Shakespeare. It is, nevertheless, an attempt to appraise the cancer problem as a whole, and this apparently extraneous matter plays its part largely in giving a literary flavour to the author's criticisms of present-day belief. Although some of his more severe castigations are directed to those who use expressions without definite meaning, and presumably think in an equally nebulous fashion, it has to be said that his own ideas are sometimes clothed in language which it is far from easy to follow. No one, however, can complain that there is anything obscure in his final conclusions, since these declare dogmatically that cancer is a virus disease, and even go so far as to add statements about the distribution of this virus and the mode of its transmission: other "apparent co-operative factors" are "but chanceful preliminaries." It is well, as the author says, that we should sometimes try to see the whole rather than a part, and the serious student of the cancer problem will find parts of this book helpful in trying to do so. But we need not consequently force a general conclusion unwarranted by facts. Not long ago Peyton Rous said it would be a pity if the final solution of this problem did not prove to involve some new biological principle. These words recur to mind with some force before the spectacle of someone who appears content with a very incomplete explanation on very orthodox lines.

THE MECHANISM OF ABSORPTION

Absorption from the Intestine. By F. Verzár, assisted by E. J. McDougall, Ph.D. (Pp. 294; 70 figures. 21s. net.) London: Longmans, Green and Co. 1936.

This monograph is a comprehensive study of the mechanism of absorption and a serious attempt to bring the whole question into harmony. The experimental work is spread over the role of biles in absorption, of hydrotropy, of hydrostatic pressure; the absorption of water and salts; the absorption of fat and the synthesis of neutral fat; absorption of carbohydrate, of bile acids, of sterols (especially cholesterol), xanthophyll, bilirubin, and flavine; absorption of amino-acids, of adrenal cortex, and of morphological particles, and the histology of absorption.

The main problem is taken to be whether it is possible to explain the facts of absorption from the intestine in physio-chemical terms. It was found that diffusion and osmosis are the chief forces, and that infiltration plays a part. There is in the absorption of certain substances a special selective advantage which seems to be completely contrary to physical laws, since from a mixture of hexoses and pentoses glucose and galactose are selectively and quickly absorbed. In the case of sterols there is also a selective absorption of cholesterol in comparison with other sterols, which seems to be true also for xanthophyll and flavine, but the study of these cases shows that there are active processes in the cells of the intestinal mucosa which influence absorption. It is shown that the pho phorylation processes in the intestinal mucosa are und the influence of the hormone of the adrenal cortex, are the phosphorylation processes in the muscles. If t adrenal cortex is destroyed the selective absorption glucose and also of fat absorption is abolished. The i complete fat absorption in Addison's disease, pellagr sprue, Gee-Herter's disease, and B_2 avitaminosis can b explained by the disturbance in the function of the adren cortex in these conditions.

Fat absorption is dealt with in a manner remarkab for its clarity, and this should do a good deal to cle up the conflicting views put forward hitherto. Fat absorbed only after being split up in the intestines b lipase; the fatty acids then continue with the paired bi acids to form molecular complexes, water-soluble, diffusibl and specially stable in the slightly acid reaction of th intestine; these complexes are broken down in the mucos cell and the bile acids are absorbed in the mucos epithelium, dissolving a greater quantity of fatty acid than *in vitro*. The fatty acid combines with glycerol t resynthesize neutral fat. The synthesis of neutral fat vi the formation of a phosphatide is an accelerating facto in the absorption of fat, and may produce the specifi fats of the body and render the fatty acids non-toxic The lecithin content of the blood is increased during fa absorption. The intermediate synthesis of the fatty acid to phospholipoids can be inhibited by mono-iodo-acet acid and by phloridzin drugs, which inhibit indirectly phos phorylation processes.

This book is a notable contribution to a complex subject and deserves careful study. It is excellently supplemente by a comprehensive and well-classified bibliography.

A GYNAECOLOGICAL TEXTBOOK

A Textbook of Gynaecology. For Students and Practitioners. By James Young, D.S.O., M.D., F.R.C.S.Ed., F.C.O.G. Fourth edition, revised. (Pp. 417; 221 figures. 16s. net.) London: A. and C. Black. 1936.

The fact that a fourth follows within three years th third edition is proof that Professor James Young's text book meets a need and is appreciated. The main change in this edition are in the chapters dealing with se hormones, and although it is probable that statement now included will have to be withdrawn in later edition their inclusion is presumably necessary if the student i to pass his examinations. The section on ovarian neo plasms includes the more recently described tumours. A healthy sanity and conservatism pervades the book, giving it a special appeal to the general practitioner. The sections dealing with leucorrhoea, pain, and backache incorporate the author's contribution to this important syndrome.

There are but few statements with which the gynaeco logist could disagree, but fibroids do sometimes grow after the menopause and Schauta's disciples can remove th malignant uterus by the vaginal route. The illustration on the whole are poor—particularly those depicting vesico vaginal fistula and vaginal hysterectomy—but the semi diagrammatic histological drawings do convey clearly the main features described. The *x*-ray picture after injection of lipiodol (Fig. 46, p. 111) gives no certain indication that the tubes are normal, particularly as no statement is made of the time which had elapsed after the injection was made. These minor criticisms but serve to indicate the general excellence of the book, and we know of n better textbook for the student or the practitioner—fo whom it was written.

A SIXTEENTH CENTURY HYGIENIST

The Wisdom of Andrew Boorde. Edited with an introduction and notes by H. Edmund Poole. Illustrated by A. E. Christopherson. (Pp. 63. Limited to 550 copies, 500 for sale at 7s. 6d.) Leicester: Edgar Backus, The Garswood Press. 1936.

The beautifully printed and charmingly illustrated little book with this title is an abridged version of *The Dyetary of Helth* by Andrew Boorde with one page from his *Breuyary of Helth* prefixed to the rest of the work. The introduction by the editor, Mr. Edmund Poole, contains a short sketch of the life of Boorde and his scientific background. He was born about 1490 at Cuckfield in Sussex, studied at Oxford, was received into the Order of Carthusians while still under age, and in 1521 appointed Suffragan Bishop of Chichester. In 1529 he was released from his vows and travelled in Europe to study medicine. On his return the following year he set up in practice and counted among his patients the Duke of Norfolk, for whom he subsequently wrote *The Dyetary of Helth,* and Thomas Cromwell, whose political agent he became. After subsequent Continental tours, during which he wrote the *Breuyary of Helth* and the *Dyetary of Helth,* he settled in Winchester, where though he kept the Carthusian rules of fasting and wearing the hair shirt, he was found guilty of fornication, for which he was imprisoned in the Fleet Prison in London, and died in 1549. In addition to the two works mentioned, Boorde has been credited with the authorship of two jest books, *The Wise Men of Gotham* and *Tales of Scrogin.* The selections from his works in the present volume contain shrewd advice concerning the preservation of health, especially in relation to domestic hygiene, food, sleep, clothing, and the avoidance of mental worry.

HYPERGLYCAEMIAS

Les Hyperglycémies. Étude Clinique et Physiopathologique. By Henri Warembourg. (Pp. 584. 65 fr.) Paris: Masson et Cie. 1936.

Dr. Warembourg of Lille has written the most extensive book on hyperglycaemias that has yet appeared. It deals almost entirely with the physiological and pathological aspects of hyperglycaemia, and the short practical section on diabetes and its treatment is not important.

The most interesting idea in the book, and indeed its *leitmotif,* is the description and significance of a new test of carbohydrate metabolism—"l'indice chromique residuel"—which is difficult to describe and is not easy to translate and assess in value. The author employs the method of Polonovski for the determination of total reducing substances in organic fluids. After removal of proteins by tungstate precipitation the filtrate is boiled with sulphuric acid and an excess of bichromate and back-titrated with hyposulphite. The amount of decinormal bichromate oxidized in this process from 1 c.cm. of plasma is called the total chromic acid index. From this the oxidation produced by glucose is subtracted and the result called the *residual* chromic acid index. This is used as an index of the non-glucose-reducing substance of the blood, and measures (among other things) the intermediary products of sugar metabolism, glycerol and its derivatives, pyruvic and lactic acids, etc. It is stated that its variations have important biological and clinical significance in diabetes and hyperglycaemias. An increase in this residual reduction is said to be a more subtle and definite indication of disturbed carbohydrate metabolism than the more usual glucose-tolerance test, and it involves a simpler technique. The book in most of its serious parts is full of references to this "residual chromic acid index," but it is always difficult to tie its meaning down to tangible results or interpretations. The reader will be annoyed at having to search for the meaning of this new test in a discursive text and never feeling clear about it. And when we read in the general conclusions that the I.C.R. is raised not only in hyperglycaemias but in hepatic insufficiencies, in obesity, in hypertension, in heart failure, in cancer, the purpose of this semi-erudite book seems too elusive.

In more practical and direct matters, concerning hyperglycaemia in all varieties of disease, we have had equal difficulty in finding a critical stability among the pros and cons in the literature quoted. We hope, if the book is much developed and republished, that brevity and clarity will be introduced.

QUACKERY AND PSEUDO-MEDICINE

Nostrums and Quackery and Pseudo-Medicine. Vol. 3. By Arthur J. Cramp, M.D. Foreword by George H. Simmons, M.D., LL.D. (Pp. 232. 1.50 dollars.) Chicago: American Medical Association. 1936.

This valuable book has been compiled by Dr. Arthur J. Cramp on behalf of the American Medical Association, of whose Bureau of Investigation he was director for thirty years. Unfortunately it concludes the work of the editor in this field, for he was compelled to retire in December, 1935, on account of ill-health. He has fought quackery for thirty years, and produced volume 1 in 1911 and volume 2 in 1921; the present volume was completed in 1930, but its publication was delayed by the financial depression.

The new volume differs from the first two in that it is more condensed. Hence it has more the character of a work of reference and contains fewer amusing tales of roguery than did the previous volumes. On the other hand, the 232 pages contain an extraordinary amount of compact information. Among other notes which may be of special interest to our readers are two pages on the "electronic reactions" of Abrams and an account of Dr. Hay and his dietary theories. The scope of the volume is best indicated by the fact that the index refers to nearly 1,500 "remedies," a considerable proportion of which are sold in this country. Dr. George H. Simmons, Editor Emeritus of the *Journal of the American Medical Association,* who during a quarter of a century had intimate knowledge of the problems involved and the responsibilities assumed by the director, writes a foreword, paying tribute to the work carried on "with the necessary caution, with courage, and with unswerving honesty of purpose" by Dr. Cramp from 1906 to 1936.

HUMAN REACTIONS

Reactions of the Human Machine. By John Yerbury Dent. (Pp. 288. 8s. 6d. net.) London: V. Gollancz. 1936.

This book is perhaps not of the importance which the publishers and their expert advisers were inclined to attach to it; but it is a very interesting example of an attempt by a thoughtful and well-read doctor to co-ordinate his reading and experience and to build up and expound some sort of coherent philosophy of human life and behaviour. The author describes it as an objective description of such behaviour, and "a plea especially for the physiological, material attitude of patients and doctors towards life and its discomforts, and for the exclusion of magic and the supernatural from the treatment of the

human mechanism." He stresses the importance of psychological knowledge in medical training and equipment, curiously describing medicine, surgery, and psychology as the three main departments of that equipment. The trinity so formed—in place of the more usual classification of psychology with anatomy and physiology as one of the essential professional sciences on which the art of medicine must be based and which must constantly permeate its practice—may perhaps be taken as an example of a certain originality or perversity (as you wish) which manifests itself throughout Dr. Dent's exposition of his theme. This exposition is able, orderly, and generally clear. The author first gives biological illustrations of the statement that "life is reaction," and then goes on, in successive chapters, to give his own presentation of the evolution and development of reaction, of the reaction to external, internal, and "conversational" environment, of conflicting reactions, and of the persistence, decrease, inhibition, and therapeutic alteration of reaction. He ends with a chapter on hypnosis, to which he attaches much importance.

To follow the author's thought and to appreciate his arrangement is a pleasant exercise which will be illuminating to many, and will doubtless carry with it some profit to all but a few. The preface invites readers to use the blue pencil. Some crudities of belief, some curiosities of deduction, some imperfections of knowledge doubtless may be found in need of such correction or deletion; but to read the book is to realize how interesting and helpful it must have been to write it.

Notes on Books

The official *Medical Register* for 1937 has now been published by Constable and Co., Ltd., at 21s., post free 22s. 6d. It appears from the table printed in the introductory pages that 1,905 names were added last year—twenty-three more than in 1935. New registrations numbered 920 in England; 490 in Scotland; 223 in Ireland; and 272 on the Colonial and Foreign lists. The total number of names on the *Register* at the end of the year was 59,010, representing an increase of 649. The number of names removed from the *Register* during 1936 was 1,304, compared with 1,057 in the previous year. Of these, 1,082 were deleted on evidence of death; 214 for failure to comply with the inquiries of the registrar as to cessation of practice or change of address; and seven were struck off under the disciplinary powers conferred by Parliament on the General Medical Council. The average annual number of penal erasures during the past twenty years was five.

Books on treatment arranged on an alphabetical plan suggest readiness of reference in an emergency rather than systematic reading and study. The *Vade Mecum of Medical Treatment*, by Dr. W. GORDON SEARS (E. Arnold and Co., 10s. 6d.), falls into this group, and meets fairly well the expectations excited by its title. It begins with "Achalasia of the Cardia" and concludes with "Xerostoma," and in the intervening pages most of the conditions met by the practitioner in his daily work receive attention. The compilation has been carefully done, and the classical methods of treatment are presented in brief and strictly practical fashion. While alternative methods are mentioned, the author not infrequently bases his recommendations on his own immediate experience. Nor does the book fail to recognize modern developments, even when these have yet to justify the promises made on their behalf. The discussions cannot pretend to be exhaustive or to offer anything very striking or original, but they have their opportunity of usefulness in the field which they profess to serve, and the volume deserves a place in the practitioner's library.

Two further additions have been made to the Sportsman's Library, published at 5s. each by Philip Allan. *The Shot-Gun*, by T. D. PURDY and Captain J. PURDY, is a useful handbook of the gun; there is a chapter on fitting, a detailed one on cartridges and powder, and valuable hints are given on the care of the gun. *Field Sports of Scotland*, by PATRICK CHALMERS, is a description of the sport to be had in the Highlands and Lowlands, the estuaries and coastal waters of Scotland, with the natural history of the roe-deer, the caper, black-game, and ptarmigan. It is well worthy of the attention of sportsmen.

A new edition has been received of Professor CARL J. WIGGER'S *Physiology in Health and Disease* (Kimpton, 42s.), which was noticed in these columns on its first appearance two years ago. Considerable portions of the book have been rewritten, new and better illustrations are included, the index has been enlarged, and the bibliography modernized.

Preparations and Appliances

ORAL PROPS IN GENERAL ANAESTHESIA

Dr. A. H. L. BAKER (anaesthetist, West Middlesex County Hospital) writes:

The accompanying illustration shows a new oral prop for use in general anaesthesia. While incorporating most of the features of existing props, this one has been designed with a view particularly to the patient's comfort and to the lessening of oral trauma. It is made in three sizes. A further modification of this may be lengthened at will so that the inner aperture lies well back over the dorsum of the tongue without undue discomfort, however, to the patient. This is especially useful in edentulous patients who have difficulty in gripping the shorter pattern with the gums and invariably block the inner aperture with the tip of the tongue. I would like to express my thanks to Mr. Talley of Messrs. A. Charles King, Devonshire Street, W.1, the makers of these props, for much helpful advice in their production.

A DUSTING POWDER

"Kinoo powder" (Kinu Ltd., 6, Finsbury Square, E.C.2) is a dusting powder made from pure cocoon silk (90 per cent.) with 5 per cent. boric powder and 5 per cent. zinc oxide. The use of cosmetics runs back far into pre-history, and that of many of the commoner ingredients such as starch, kaolin, and calamine is of like antiquity. Modern methods of applied chemistry have provided a very wide choice of powders for such purposes, but firmly established traditions have checked enterprise in the employment of new methods. The traditional bases are, however, unsatisfactory in certain respects—for example, starch when moistened forms a fermenting paste. The silk basis of kinoo powder gives a very fine, light, and voluminous powder, which has absorbency without producing a paste which is liable to fermentation. An independent analytical report confirms the makers' statements regarding the composition of the powder, and shows that it has a very low bacterial content and that no organisms of the *B. coli* group are present.

STERICREPE BANDAGE

"Stericrepe bandage" is made of a porous elastic material lined with sterilized gauze. It is self-adhering, and does not stick to skin or hair. It is porous, seamless, greaseproof, waterproof, and washable. After rolling it off and sprinkling it with ordinary talcum powder it can be used again. It can be applied with any desired tension as a support, and only a minimum of dressings is required. It is supplied both in bandage rolls and finger strips by the makers, at 23, Clarges Street, Piccadilly, W.

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ZINC PROTAMINE INSULIN

It is a sure index of the importance of a new therapeutic agent when its introduction is quickly followed by the appearance of modifications for which even more advantages are claimed. The protamine insulin of Hagedorn has not waited long for such recognition of its merits. The most successful of these modifications appears to be the zinc protamine insulin produced by D. A. Scott of Toronto, and investigations into the clinical use of this preparation have recently been reported by Rabinowitch and his co-workers[1,2] in Canada, and by Wilder[3] and by McCullagh[4] in the U.S.A. A paper by Dr. R. D. Lawrence and Dr. Nora Archer appeared in the *British Medical Journal* last week (p. 487) and a contribution to the subject by Dr. H. P. Himsworth is printed in this issue at page 541. These workers have been content to designate this insulin briefly and clearly either as zinc protamine insulin or protamine zinc insulin, but the English manufacturers and the Ministry of Health, intent on attaining a high standard of terminological exactitude, have issued the new preparation under the title of "protamine insulin (with zinc) suspension." It is to be feared that the essential distinction embodied in the parenthesis of this phrase will not survive the rough handling of common usage, and if the new preparation is to remain clearly differentiated from the other protamine insulins it would appear desirable that the original and more convenient term of "zinc protamine insulin" be generally adopted.

The essential advantage of the original protamine insulin—insulin retard—was that its action was slower and more prolonged than that of ordinary insulin; hence fewer injections were required and a smoother control of the diabetic's metabolism was obtained. The reports on zinc protamine insulin indicate that the new preparation has an action which is even slower and more prolonged than that of insulin retard. This slow and prolonged action has obvious advantages, but also disadvantages, which are clearly demonstrated in the above reports on its clinical use. The prolonged action permits reduction in the number of insulin injections. With one injection of insulin retard control for twelve or fifteen hours was obtained; with zinc protamine insulin control is achieved for twenty-four hours or even longer. This makes it possible for that large group of mild diabetics requiring up to a total of 20 to 30 units in divided daily doses of ordinary insulin to be maintained in a satisfactory state of balance by means of one injection of the zinc preparation given before breakfast. For reasons that will be explained later, patients with more severe diabetes, requiring larger amounts of insulin, need in addition a supplementary dose of ordinary insulin; but as this can be given at the same time as the injection of zinc protamine insulin the inconvenience thus caused to the patient is negligible.

The reduction in the number of daily injections is a convenience to the patient, but is in itself no indication that the new preparation has the fundamental property of permitting a more effective control of diabetes. That zinc protamine insulin does indeed allow more effective control of the disease than does ordinary insulin is shown by the ability of the new preparation to control the disease during the night. It has long been known that in patients with diabetes of any severity hyperglycaemia, consequent glycosuria, and sometimes ketosis develop spontaneously during sleep. Whereas multiple daily doses of ordinary insulin enable control to be maintained in the waking hours, the relatively transient action of ordinary insulin is insufficient to restrain the disease in the long interval between the evening and morning injections. Such patients for half the twenty-four hours are virtually cases of untreated diabetes. By means of zinc protamine insulin these cases can be completely controlled. The injection of an appropriate dose before breakfast is enough to ensure control of the disease throughout the following night. The prolonged action also enables a continuous rather than an intermittent restraint to be maintained during the day. Although the slow action of the new preparation is not so effective as the rapid action of ordinary insulin in suppressing the morbidly exaggerated hyperglycaemia following meals, the persistence of the action beyond the times at which ordinary insulin action would have waned results ultimately in a lower post-prandial blood-sugar level. As a consequence, when zinc protamine insulin is being taken the average blood-sugar level during the day is usually a good deal lower than when even larger doses of ordinary insulin are being administered in several injections. The slowness with which zinc protamine insulin comes into action militates against sudden reduction of the blood sugar, and as a result against the frequency of hypoglycaemic attacks.

[1] *Canad. med. Ass. J.*, 1936, **35**, 239.
[2] Ibid., 1927, **20**, 287.
[3] *Minnesota Med.*, 1937, **20**, 6.
[4] *Cleveland Clin. Quart.*, 1937, **4**, 26.

It would be expected that for the same reason patients taking the new insulin would be less liable to the hypoglycaemic attacks which can be induced by exercise. On this point there is some disagreement. Himsworth states that attacks from this cause are less frequent, and, indeed, goes so far as to advocate the use of zinc protamine insulin for those patients who, when taking ordinary insulin, are unusually sensitive to the effect of exercise. Lawrence and Archer fear that under the new treatment hypoglycaemia will be produced more easily by exercise, but admit that this has not been the experience of their patients who have to lead energetic lives. Wilder, from his experience, forms the opinion that hypoglycaemia during the night may result from excessive exercise during the day. It is probable that experience will show that although the familiar hypoglycaemic attacks which supervene shortly after or during exercise when the patient is taking ordinary insulin do not occur when zinc protamine insulin is being administered, hypoglycaemic attacks several hours after the provoking exercise will become common. If this is so the taking of an extra carbohydrate meal at the appropriate time will prevent any untoward effect.

The very properties to which the clinical advantage of zinc protamine insulin can be attributed are also responsible for its disadvantages. The slowness with which it comes into action prevents in all but mild cases adequate restraint of the alimentary hyperglycaemia resulting from meals. The injection being given before breakfast, the intensity of insulin action is naturally weakest when breakfast is taken, but becomes progressively stronger as the day goes on. For this reason, in moderately severe cases hyperglycaemia and glycosuria will occur after breakfast and to a progressively less extent after the succeeding meals. In the relatively rare severe cases gross hyperglycaemia and glycosuria appear after every meal. In explanation of this Lawrence and Archer suggest that small doses of zinc protamine insulin come into action more rapidly than large doses. On the face of it this explanation seems improbable, and it is controverted by experiments recorded in Rabinowitch's paper. A more probable hypothesis would appear to be that post-prandial hyperglycaemias in moderately severe cases, which need relatively small doses of zinc protamine insulin, require less intensive insulin action for their suppression than do similar rises in severe diabetics who need large doses.

In patients with moderately severe diabetes, in whom marked hyperglycaemia appears only after breakfast, adequate control can be obtained by injecting, simultaneously with the zinc protamine insulin, a small dose of ordinary insulin. This, exerting its action rapidly, deals with the influx of sugar from the gut, but its action wanes by the time that the zinc protamine insulin is coming into full action and becoming capable of dealing with later meals. In the severe cases this method, while enabling restraint to be exerted over the post-breakfast hyperglycaemia, is insufficient to suppress the alimentary glycosuria brought about by the later meals. Wilder and Himsworth claim to have established control in such patients by injecting, simultaneously with the zinc protamine insulin, not ordinary insulin but a moderately slow-acting insulin such as insulin retard.

The great drawback of the new insulin is the type of hypoglycaemic attacks to which it gives rise. Though it is true that the slower action results in fewer such attacks than happen with ordinary insulin, it is also true that the attacks which do occur are of unusual severity. Two factors contribute to this. The fall of blood sugar induced is so gentle that the early warning symptoms of hypoglycaemia are not evoked, and the first evidence of an attack may be convulsions or loss of consciousness. The attack having begun the prolonged action of the new insulin holds the blood sugar down at hypoglycaemic levels, thus preventing spontaneous recovery and militating against attempts to raise and maintain the blood sugar at normal levels. Himsworth and Wilder stress particularly the severity of these attacks. Wilder goes so far as to advise that when a patient is taking zinc protamine insulin he should never sleep alone, and he quotes the remark of one of his patients: "I don't have diabetes any more; I have insulin reactions." Realization of the gravity of such attacks has led to insistence upon two rules. First, it is insisted that at the beginning of treatment with zinc protamine insulin the patient must be in hospital or under such conditions that he can be closely observed; secondly, that attempts to control severe cases completely by one daily injection of the new insulin alone must be abandoned. Instead, it is advocated that zinc protamine insulin should be given only in such doses as will prevent glycosuria during the following night, and that any escape from control during the day should be dealt with by the easily controlled ordinary insulin.

The clinical experiences recorded in these papers are in remarkable agreement, and establish clearly that zinc protamine insulin is a more effective therapeutic weapon than ordinary insulin. All the investigators recognize the same advantages, but the Canadian workers do not emphasize the dangers of the severe hypoglycaemic attacks which are likely to limit the use of the new preparation in ordinary medical practice.

THE FACTORIES BILL: AN ADVISORY BOARD?

The days when the law in its formulation and interpretation was based for long periods on fairly fixed principles of human conduct and environment have gone. Modern applied science causes conditions to change more quickly than Parliament can wisely change its enactments. Hence, as was pointed out in a leading article in the *British Medical Journal* of February 27 (p. 450), the newer, less democratic, but more flexible technique of rule by Order in Council or Statutory Order becomes not only more common but more necessary. Lord Hewart, in *The New Despotism*, warns us against the serious implications of this departure from the principle whereby the courts are the final arbiters of appeal against the executive. He shows how by this new method, which in a totalitarian State is the only source of law, the citizen virtually has no appeal, because the maker of the law, in our case a Secretary of State, can be both formulator and judge of his own actions. This is dangerous and needs to be checked. The difficulty is to devise means whereby the elasticity of the new methods can be turned to advantage while safeguarding ourselves from the thin end of the wedge of executive tyranny. The British people have no liking for the *droit administratif*. Graham Wallas and his school of social thinkers showed a way out. The advisory board or committee of experts based on the principle of co-option gives at once an additional source of strength to the administrative machinery and a safeguard against oppressive rule. Co-opted members of committees have shown themselves to be generally among the most valuable members of such bodies. The experience of education committees has demonstrated this. It is not that they are better men or women, but on the whole they are more keen, and this results from their freedom from electoral pressure.

Experts are dangerous people unless used properly. Their function lies in advising lay bodies composed of intelligent but often uninformed persons. The ultimate results achieved in this way are generally excellent. The lay bodies, being appointed for their judicial and critical wisdom, digest and compare the different aspects of expert advice. Apparently more cumbersome in method than the direct contact between executive and appointed adviser, the principle of advisory boards, part lay part expert, has enormous advantages. It lends to decisions a comprehensiveness which, if they are to find expression in Orders with the force of law, is essential. We take the opportunity when a new and important measure like the Factories Bill is passing through Parliament to urge that during the committee stage a clause should be inserted directing the Secretary of State to set up such an advisory board to deal with the mass of Statutory Orders which will have to be issued. We suggest that a permanent board of about six persons with a judicially minded chairman should be set up by the Minister, the members being representative of employers, of workers, and of Parliament. To this board should be co-opted a panel of doctors, industrial administrators, physiologists, psychologists, engineers, and such others as from time to time may seem desirable. The board sitting to discuss certain matters would call in the relevant co-opted members, so that when the Orders finally emerged they would be in tune with practical reality, with humane requirements, and with scientific knowledge.

The experiment is well worth trying, and Parliament could enter a proviso that after, say, a three-year trial the whole method must be reviewed in the light of experience and of the desirability of its extension to other types of legislation. For every issue the number of non-political co-opted members should be so arranged that it is not less than the number of full members. The plenary sessions of the board ought to be public. If all powers to make Statutory Orders were based on the principles outlined above we feel that much of the sting would have been extracted from the "new despotism" and a notable advance achieved in scientific government.

TWINS ON A VEGETABLE DIET

In a recent report[1] D. E. Lane makes some interesting observations on the effect on the growth of twins of a vegetable diet planned to contain all the requirements suggested by modern scientific studies on nutrition. These children are now 7 years old, and Dr. Joseph Brennemann, after examining them on their last birthday, considered their state of nutrition to be excellent: the teeth were good and there was no evidence of dental caries. The twins had apparently been freer than the average child from infection of any kind. The dietetic regime was as follows. They were given "vegetable milk" and increasing amounts of orange juice and cod-liver oil during early infancy, with the gradual addition of wheat, barley, rice, potato, legumes, and various fruits and vegetables in season. At approximately 3 years of age their general condition was so good that it was thought advisable to go on with this type of feeding until their physical state should warrant a change to the conventional mixed diet containing cow's milk. This time has apparently not yet arrived, and the only change in the diet as the children have grown older has been that many of the foods

[1] *Amer. J. Dis. Child.*, 1936, **52**, 1397.

are now served in a more solid form. Bread made with the "vegetable milk" was given at an early age, and this contained dried fruits and whole almonds. Much care has been taken over the vegetable milk, which in its improved form is known as "almond-lac." It is prepared from a fine preparation of almond meal with corn starch, dextrin, and maltose. Dehydrated leafy vegetables supply the mineral content of the milk, and as now prepared "almond-lac" can be used in place of cow's milk. Its content of the vitamin B complex is high, and it also contains appreciable amounts of vitamins A and C. Careful study of calcium storage shows that with this milk and other vegetable foods entirely satisfactory results have been obtained, and this is reflected in the normal state of dentition. The object has been not only to study the growth of the twins but also to demonstrate that "almond-lac" can safely be taken over long periods without any harm to health, for it has been found of great value in children with infantile eczema due to hypersensitivity to other food substances. If one twin had been brought up on this strictly vegetable diet and the other in the more orthodox manner the value of the experiment would have been much greater. It is evident that such care has been taken of the twins that good results might have been expected with almost any diet.

A STUDY OF ONE THOUSAND PLACENTAS

The histopathology of the placenta has attracted no little attention in recent years, and there are those who claim that maternal syphilis and the late toxaemias of pregnancy cause specific changes in this organ. Much of the confusion surrounding this subject is attributable to the fact that writers interested in one problem devote their attention to placentas from women manifesting certain symptoms during pregnancy and pay insufficient regard to the wide ranges of variation in normal cases. W. B. Haver[1] has made a careful study of one thousand consecutive placentas obtained from white women. He concludes that placental infarcts may be divided into two groups, foetal and maternal. In the early stages of placental formation the trophoblast is invasive and the syncytial cells do not cause the blood to clot. Later the enzyme action is lost and degeneration occurs in the syncytial cells, so that they no longer inhibit, but actually cause, the deposition of fibrin. Similarly the decidua undergoes degenerative changes with the formation of red infarcts, which in time become white. Although the incidence of these infarcts was higher in the group of women suffering from the late toxaemias of pregnancy some 30 per cent. of the placentas from this group "were as nearly normal as are usually found at term." Moreover, the placentas from women suffering from pre-eclamptic toxaemia which showed marked infarct formation merely evinced pathological changes "exactly similar to, but more extensive than, those seen in the average normal cases," although equally marked changes were found in placentas from women who manifested no symptoms and gave birth to living children. It was therefore concluded that infarct formation is evidence only of senility in the organ and that the factors associated with pre-eclampsia tended to hasten these changes. The author was unable to diagnose syphilis from the gross or histological study of the placenta. He observed the condition of placentosis described by Goodall in 226 placentas, and formed the opinion that the condition is due to passive congestion of the placenta, which is, as a rule, of no clinical significance. The interesting problem remains: What are the factors which cause infarction in approximately 50 per cent. of all placentas, or, conversely, what are the factors which resist their formation?

[1] *Amer. J. Obstet. Gyn.*, 1936, **32**, 795.

RADIOLOGY AND ITS RELATION TO MEDICINE

Radiology is a rapidly expanding subject, both in the details of conditions already susceptible to *x*-ray investigation and in new fields. The increasing complexity of radiological work presents a problem to him who undertakes it because of the diversity of specialized knowledge he should in theory possess. He must be acquainted not only with radiological interpretation but with the various departments of medicine and surgery which seek his help in diagnosis and therapy. It is obviously impossible for any one person to achieve expert status in all these branches, but the nearer the radiologist approximates to that ideal the greater his value to his colleagues. It has been suggested that he should be content to enumerate in his report the radiographic and fluoroscopic departures from the normal appearances, without indicating their diagnostic significance. This does not help matters greatly, since someone must correlate the radiological with the other evidence, and for this the radiologist's experience possibly equips him better than the clinician. The difficulty should primarily be met by co-operation and consultation between the radiologist and the clinician. It is a commonplace how often a doubtful *x*-ray diagnosis is made definite by some point in the clinical aspect of the case, and such doubts can only be cleared up by personal consultation. More information will be obtained from *x*-ray examinations in this way than if the two work in water-tight compartments. To make such co-operation fruitful the radiologist should widen his knowledge as much as possible in general medicine and surgery, in the special branches, and in pathology. The last, being the basis of so many of the changes seen in a radiograph, is of particular importance, and is emphasized in a recent article by K. Kornblum and H. J. Tumen.[1] That radiologists as a whole are alive to these problems is indicated by the fact that at the International Congress of Radiology to be held in Chicago this year the main subject is the unity of medicine and surgery in its relation to radiology. This is a matter which has fully occupied the attention of radiologists in this country. In 1934 the British Association of Radiologists was founded "to promote the interests of radiologists in relation to medicine, with special reference to the following aspects: (1) clinical, (2) educational, (3) ethical, (4) economic. . . ." In

[1] *Amer. J. Roent.*, **36**, 202, 232.

1936 the council of this body approved the establishment of a Fellowship of the British Association of Radiologists to meet the need for a higher radiological qualification. Those who have framed the regulations for the Fellowship examination hold that radiologists should have a wide knowledge of clinical medicine, of pathology, and of certain aspects of general surgery if they are to make the fullest use of their specialty. They have therefore appointed among their examiners a physician, a surgeon, and a pathologist. The first examination for the Fellowship will be held on November 29 of this year. The medical profession will, we are sure, welcome the step that has been taken to consolidate the educational equipment of the radiologist.

THE WORK OF DR. CRAMP

The fight against quackery that has been conducted for thirty years and more by the American Medical Association is well known in this country, and its value is appreciated not only by the medical profession but by all who are interested in the combating of commercial fraud. In particular many of our readers will be familiar with the two interesting and racy volumes entitled *Nostrums and Quackery* that appeared in 1911 and 1921. A third volume of the same quality, entitled *Nostrums and Quackery and Pseudo-Medicine*, is noticed on another page, but our pleasure in welcoming it is qualified by the regret with which we learn that the author, Dr. Arthur J. Cramp, has been compelled by ill-health to relinquish further work on these lines. All three volumes have been compiled by Dr. Cramp, who for thirty years has led this struggle against heartless fraud. This is a fine record of courageous persistence in public service. The persistence is all the more remarkable because the struggle is endless. Disease and suffering beget credulity, and wherever credulity exists knaves will be found ready for its exploitation. It might be thought that an ordinary sense of human decency would act as a check on the exploitation of human misery, but experience teaches otherwise, and indeed in no other field of commerce do we encounter such impudent fraud as in the sale of quack medicines. Whenever a fraud is exposed half a dozen new ones spring up to take its place, but Dr. Cramp has never been disheartened by the unending nature of the task to which he devoted his life. In his introduction to the new volume he points out that the quack trades on human ignorance more than on human stupidity, and that credulity can only be remedied by a spread of knowledge. He expresses the hope that a Utopian period may arrive when it will be as legally dangerous to falsify in any medical advertising as it is under present law to make false or fraudulent statements on or in the trade package. We are as far away from this moderate ideal in this country as our colleagues are in the United States, but if any advance is made Dr. Cramp will have the satisfaction of knowing that he has done more to prepare the way than any other man. The quack nostrum trade is international in its activities, and the British medical profession owes a great debt to Dr. Cramp for providing it with the information necessary for combating both home-produced and imported frauds. We can only state our thanks and express the hope that he will enjoy the leisure he has earned by his many years of strenuous combat.

VOLKMANN'S CONTRACTURE

Ever since 1881, when Richard von Volkmann of Leipzig first described this condition, there has been a good deal of speculation about its precise nature. It has been regarded by some as an ischaemic myositis or an ischaemic muscular atrophy, and more recently by Leriche as an arterial infarction with necrosis and venous stasis and exudation, followed by a slow sclerosis resulting from the initial vascular lesion. It is well known that Volkmann's contracture has a rapid onset, most often results from injuries in the region of the elbow which are treated by flexion at this joint, and follows treatment by too acute flexion or by tight splints, bandages, or casts which interfere with the circulation in the forearm. Pain is usually intense and should be the signal for early diagnosis: it cannot be insisted upon too forcibly that a fracture in the course of treatment should not be painful, and that if pain is present its cause must be sought. In all cases of fracture of the elbow a careful watch should be kept upon the digital circulation, as any signs of its impairment call for investigation. In addition to the removal of tight splints and bandages and the relief of flexion compression, further decompression of the forearm vessels can be brought about by dividing and opening up the deep fascia (aponeurotomy). In a recent paper on the pathology of Volkmann's contracture MM. L. Tavernier, J. Dechaume, and F. Pouzet[1] give details of three cases in children aged 8, 10, and 5 years. From careful histological studies of pieces of forearm musculature taken during aponeurotomy they agree with Leriche that muscle infarction is the primary factor and that interstitial exudation with further vascular obstruction and anoxaemia are contributory ones. The contracture is not the inevitable result of this process but comes about gradually as sclerosis occurs in the affected muscle fibres. "La griffe n'est pas une séquelle définitive, mais un processus pathologique en constante évolution." This study not only throws more light upon the nature of Volkmann's syndrome but emphasizes the importance of early decompression.

The one hundred and first annual general meeting of the Royal Medical Benevolent Fund will be held in the library of the Medical Society of London, 11, Chandos Street, Cavendish Square, W., on Tuesday, March 16, at 5 p.m., with the president, Sir Thomas Barlow, in the chair.

A widely supported manifesto in favour of Sir Henry Brackenbury's candidature for the forthcoming Combined English Universities Parliamentary election will be found in this week's *Supplement* at page 127. Polling is from March 15 to 19.

[1] *J. Méd. Lyon*, December 20, 1936, p. 815.

ENDOCRINES IN THEORY AND PRACTICE

This article is one of a series on Endocrinology contributed by invitation

THE PHYSIOLOGY OF THE ENDOMETRIUM AND UTERINE MUSCLE, AND OF THE OVARIAN CYCLE

BY

J. M. ROBSON, M.D., D.Sc.

(Concluded from page 514)

The Genesis of Menstruation

The alterations in the secondary sex organs occurring during the various phases of the sex cycle are under the control of the hormones secreted by the ovaries. The changes in the ovary, as has already been explained in a previous article (*Journal*, March 6, p. 512), are in their turn controlled by hormones produced in the anterior lobe of the pituitary gland; the pituitary hormones have, however, no direct effect on the uterus or on other secondary sex organs.

The general scheme of the alterations in the uterus—follicular phase–ovulation–luteal phase leading to menstruation—has already been described. This scheme is based on numerous investigations and observations on the state of the uterus and the ovaries in primates, including the human subject, at various stages of the menstrual cycle. There is also ample evidence that the two chief phases of the cycle—the follicular and the luteal phases—are controlled essentially by the two ovarian hormones oestradiol and progesterone. Indeed, the conditions of the uterus in the follicular and luteal stages have been reproduced on numerous occasions by hormone injections in ovariectomized women and in monkeys. Administration of large doses of oestrin will produce a proliferated endometrium similar to that present at the end of the follicular stage of the menstrual cycle. If such a period of oestrin injections is followed by the administration of suitable doses of progesterone then a secretory endometrium typical of the luteal phase of the menstrual cycle is produced.

Equivalent conditions of the uterine endometrium can also be obtained in the lower animals. The exhibition of oestrin brings about a state of the uterus similar to that seen at oestrus, and injection of progesterone after a period of oestrin administration causes a state of the uterus similar to that seen during the normal luteal stage of the sex cycle. Indeed, the typical endometrial condition thus produced in the rabbit (progestational proliferation) is used extensively for the standardization of preparations of the corpus luteum hormone, though synthetic preparations of the hormone are now becoming available, the dosage of which does not depend on animal standardization, as a definite weight can be given.

Oestrin Production and Menstruation

The interrelations of oestrin and progestin in their action on the uterus require some consideration. The typical effects of progesterone on the uterine endometrium and muscle are only seen when these structures have been previously under the influence of oestrin. This latter substance therefore prepares the uterus for the action of the luteal hormone. This is, of course, what occurs in the menstrual cycle, in which the luteal follows the follicular phase. Oestrin, however, is also produced during the luteal phase of the cycle, and acts then synergistically with progesterone in controlling the uterine changes. Indeed, examinations of the hormone content of the blood and urine during the various phases of the menstrual cycle suggest that oestrin production is at a maximum during the later stages of the cycle. Quite large quantities of the hormone are excreted in the urine of primates during both the follicular and the luteal stages, but the excretion of oestrin decreases during menstruation itself.

Peaks of oestrin excretion at ovulation and also later in the cycle have been described. The hormone content of the blood is low in the follicular phase but increases gradually and reaches a maximum a few days before the onset of menstruation. Too great a reliance cannot at present be placed on the quantitative data of oestrin production and excretion, as methods of extraction are by no means yet standardized, but the available data nevertheless demonstrate that oestrin may be found during all phases of the menstrual cycle, and suggest that the production is at least as great during the later part of the cycle as at any other time. Furthermore, they show that associated with the onset of menstruation there is a decrease in the oestrin production. Much experimental evidence also supports the view that the menstrual bleeding follows a withdrawal of oestrin. The administration of large doses of oestrin to ovariectomized primates, including women, is followed by uterine bleeding, which occurs as a rule several days after the last injection of the hormone. Occasionally, however, bleeding may take place during the period of administration of oestrin, but it appears likely that this is due to an insufficient dosage of the hormone, and that when adequate amounts of oestrin are given there is no uterine bleeding during administration but only after it.

There has been much discussion about the relative importance of oestradiol and progesterone in the genesis of menstrual bleeding. It has been found experimentally that if an ovariectomized monkey is given oestrin the bleeding which usually follows cessation of the injections can be delayed by the administration of progesterone, and that uterine bleeding then occurs several days after the last injection of the luteal hormone. On the other hand, uterine bleeding during progesterone administration has been demonstrated in a monkey in which the oestrin level was decreased. This suggests that the fall in oestrin level is the essential factor in the genesis of uterine bleeding. In the normal ovular cycle this fall probably takes place about the same time as the luteal activity ceases and leads to bleeding from a secretory endometrium, while in the anovular cycle no alteration in luteal activity is involved, and the uterine bleeding following a decrease in oestradiol production occurs from a proliferated endometrium.

During the whole of the menstrual cycle (and during pregnancy) a substance is excreted in the urine of women which has certain properties ascribed to the male hormone. Whether this substance plays a part in the control of the uterine changes during the menstrual cycle and during pregnancy is at present unknown.

Sterility and Fertility During the Sex Cycle

The alterations in the ovaries and uterus during the menstrual cycle and during the corresponding phases of the sex cycle in the lower animals have now been described, and before going on to an examination of the changes which take place during pregnancy the question of the time in the menstrual cycle at which fertilization and conception can occur will be briefly discussed.

Obviously there can be fertilization only after ovulation, and the period during which coitus may lead to conception is therefore determined by three factors: (1) the actual time of ovulation during the menstrual cycle; (2) the period of time after ovulation during which the ovum can be fertilized; and (3) the period of time during which spermatozoa remain capable of fertilizing the ovum after they are introduced into the female genital tract.

Evidence derived from the study of the state of the ovaries and uterine endometrium during various phases of the sex cycle gives a satisfactory answer to the first question. It appears probable that in primates, including women, ovulation occurs at about the middle of the menstrual cycle, though the experimental data for monkeys suggest that in exceptional cases it may take place rather earlier or later. On the whole the available evidence is strongly in favour of the view that ovulation almost always occurs well within the middle third of the menstrual cycle.

No answer based on direct evidence can be given to the second and third questions in so far as the human subject is concerned; but there is good evidence that the periods during which the ovum can be fertilized after ovulation and spermatozoa retain the power of fertilization after coitus are comparatively short in a large number of species investigated. It would indeed appear that the ovum can no longer be fertilized even a few hours after its extrusion from the ripe follicle, while the spermatozoa in the female genital tract retain their power of fertilization at most for a few days after coitus. It seems most unlikely that the behaviour of the ova and spermatozoa in the human subject should be essentially different in this respect from those in the lower animals.

The conclusion from these data is that coitus can only lead to conception when the former takes place within the middle third of the menstrual cycle. Recent carefully controlled experimental work in monkeys and observations in women are in agreement with this conclusion. On the other hand, there is much previous evidence which suggests that conception can occur at all times during the menstrual cycle. Only carefully controlled clinical work by observers fully cognizant of the physiological factors involved can lead to a definite conclusive answer to the question. The general practitioner is in an especially favourable position to obtain such evidence.

Changes in the Ovaries and Uterus During Pregnancy

If the ovulated ovum is fertilized and becomes implanted then the phase of activity of the corpus luteum is markedly prolonged and extends over an appreciable part of the ensuing gestation. During the development of the implanted ovum an organ for the nutrition of the embryo is formed—the placenta—which then probably takes an important part in the production of hormones during pregnancy.

The processes of follicular maturation and ovulation which take place at regular intervals in the non-pregnant subject are inhibited during gestation. Nevertheless cyclical waves of follicular growth occur, but the follicles do not become mature and do not ovulate, and hence no corpora lutea are formed. The duration of activity of the corpora lutea of pregnancy varies in different species. Thus in the rabbit they remain active throughout the whole of gestation and their removal is followed by abortion (or absorption of the uterine contents if they are removed early in pregnancy). In the mare the corpora lutea rapidly atrophy after the first third of gestation, but their removal at any stage after implantation does not lead to abortion. Similarly in the human subject the corpora lutea are probably not active in the later stages of pregnancy, and removal of the ovaries even early in gestation can be followed by a normal pregnancy and parturition. It appears likely that in certain species the production of the luteal hormone progesterone is partly taken over by the placenta, and that after removal of the ovaries and corpora lutea in these species the vicarious secretory activity of the placenta is sufficient to maintain a normal gestation.

During pregnancy in primates the production of the follicular hormone oestradiol markedly increases, and large quantities of oestrogenic substances derived from it (oestrone and oestriol) are excreted in the urine. As in the second or secretory stage of the menstrual cycle, the corpus luteum probably takes part in the production of the follicular hormone during pregnancy, thus secreting both progesterone and oestradiol. After removal of the ovaries the production and excretion of oestrogenic substances is continued, and it appears likely that the placenta is the source of this hormone too; the vicarious production of oestradiol by the placenta is again sufficient to maintain normal gestation in women in whom the ovaries have been removed. It is of great interest that most of the oestradiol produced during pregnancy is rapidly converted into and excreted as inactive compounds (of glycuronic acid), and that only just before and at parturition does this hormone not become inactivated and is therefore excreted as active oestrone and oestriol.

There is considerable increase in the size of the uterus during pregnancy, necessary to accommodate the developing foetus. To some extent this growth is brought about by the large quantities of ovarian hormones produced at that time, but other factors, about which little is known, are probably also involved. Local distension is certainly one of the factors responsible for the growth of the uterus, for it has been shown that some hypertrophy will occur when the distension is brought about experimentally, apart from pregnancy.

The alterations in the uterine endometrium in the earliest stages of pregnancy are similar to those observed in the secretory stage of the menstrual cycle, and are under similar hormonal control—that is, progesterone and oestradiol secreted by the ovaries. These two hormones are necessary for the formation of the placenta, which follows implantation, and, indeed, a decidual reaction can be elicited experimentally when trauma is applied to the uterus of non-pregnant animals subjected to the action of the two ovarian hormones.

The alterations in the physiological activity of the uterine muscle during pregnancy have been especially studied in an attempt to elucidate the factors which maintain gestation and initiate parturition. Quantitative measurements of the reactivity of the muscle to the oxytocic hormone of the posterior pituitary lobe have been made in several species, and it has been found that the muscle always attains its maximum reactivity at parturition, when very small doses of oxytocin will bring about its contraction. This is true both for the organ *in situ*

and for strips of muscle suspended in physiological solution; and clinical experience with the oxytocic hormone also leads to the same conclusion as regards the human uterus. That the spontaneous rhythmic contractions of the uterine muscle gradually increase during pregnancy and attain their maximum at parturition can be concluded from clinical observation as well as from experimental data.

The alterations in the physiological activity of the uterine muscle during pregnancy are controlled by the ovarian hormones, the conditions being somewhat similar to those already discussed for the luteal phase of the menstrual cycle. To what extent progesterone plays a part in the control of the activity and reactivity of the muscle of the pregnant uterus in species other than the rabbit is rather doubtful; there exists little positive evidence on the question, and further experiments on primates are very desirable. There is a good deal of evidence, however, that the follicular hormone plays an important part in bringing about the gradual increase in the spontaneous rhythmic activity and reactivity to oxytocin which appears during the course of pregnancy, and that the culminating process of parturition may be dependent on the action of this hormone—that is, oestradiol. The sudden and marked increase in the elimination of active oestrogenic material about the time of parturition also suggests that oestradiol is a causative factor in the mechanism of parturition.

BIBLIOGRAPHY

Allen, W. M. (1932). *Sex and Internal Secretions*, Baltimore.
Corner, G. W. (1933). *Medicine*, **12**, 61.
Knaus, H. (1934). *Periodic Fertility and Sterility in Woman*, Vienna.
Parkes, A. S. (1929). *The Internal Secretions of the Ovary*.
Robson, J. M. (1934). *Recent Advances in Sex and Reproductive Physiology*.
—— (1936). *British Medical Journal*, **1**, 1033.
Zuckerman, S. (1932). Ibid., **2**, 1093.

SURGERY OF THE THYROID GLAND

LECTURES BY SIR THOMAS DUNHILL*

LECTURE III

In his third and last Lettsomian Lecture before the Medical Society of London on March 1 Sir THOMAS DUNHILL dismissed the consideration of surgical technique by saying that it was best studied in the operating theatre. Each surgeon varied in the details of his procedure. He described and illustrated the operation table he favoured, drawing attention to the neck rest. He added that his death rate had remained at about 2.6 per cent.; it had never been below 2.5 or above 3. To his actual knowledge forty-one patients had died without operation after having made an appointment for consultation, or while awaiting admission, or during the first few days after admission. Post-operative management should be easy, but was often neglected. The new tranquillity, the low pulse rate and regular rhythm, the increasing strength were sometimes liable to induce carelessness. The regained health was worth guarding.

Malignant Disease

Sir Thomas Dunhill said that he did not propose to cover the entire field of malignant disease of the thyroid gland, but only to make such observations as seemed to him of interest and importance. Metastases might occur in malignancy of such a low grade that for a long time it might be regarded as innocent. In no other organ did malignant change work slowly enough for its operation to be watched. It had been seen how responsive was the thyroid epithelium to stimulation. The morphological appearance of the epithelium might vary greatly in simple tumours. To be of service to their patients they must recognize the very beginnings of malignancy, and for this they were dependent on histology. If they who had the care of patients were to save the lives of some of them they must learn what changes were suspicious enough to justify their belief and line of action, show clinical evidence of such weight that it could not be ignored, and re-examine the histological conclusions in the light of such knowledge.

"Malignant adenoma" was not a perfect term, but in the present state of knowledge it might be the most satisfactory. It was intended to convey a malignant transformation, while the tumour yet maintained in some respects the morphological characters of an adenoma. This type of carcinoma constituted a high percentage of the total number—the average in very large clinics was 85 to 90 per cent. Benign adenomata differed from one another. Some were composed of anastomosing columns of cells; in others differentiation had occurred, and the tumour consisted of follicles. When malignant transformation took place these ancestral characteristics were maintained to a considerable extent, though ultimately the differentiation was lost and the cells grew in disorderly fashion, presenting the appearance conveniently called medullary, and many authors had given that name to a type of carcinoma.

Often some degree of papilliferous activity occurred. One could not say with certainty where normal tissue ended and tumour tissue began. The incidence of papilliferous adenocarcinoma constituted about 24 per cent. of his total, but apparently this was not the case in some other countries. One authority in Switzerland had mentioned its rarity there. This type, unlike malignant adenoma, spread to neighbouring glands. It was very slow in its evolution. He mentioned four cases in which this change had been shown. Of two he had lost trace, although he had kept in touch with both of them for over seven years. One other had died in St. Bartholomew's Hospital, and in one the condition was causing extreme discomfort. It was interesting that out of forty-five cases collected from literature, including his own, the condition in twenty-five became obvious before the age of 30, and in fifteen before the age of 20. A third type was scirrhous, which was infrequent; it originated in the same manner as scirrhus in the breast.

Illustrative Cases

Turning to illustrations of cases the lecturer mentioned one woman, seen in 1930, in whom the histological examination showed at least three types of fibroid epithelium. This case illustrated how the morphological types of epithelium might overlap. He removed the tumour, *x*-ray treatment was given at St. Bartholomew's, and she was well for five years. In 1935 the breathing became laboured on slight exertion and several quite severe haemorrhages occurred. Examination showed a projection into the trachea, just below the larynx. After she had been given an appropriate amount of *x*-ray treatment it flattened out.

Speaking with regard to lymphadenoid goitre, Sir Thomas Dunhill said that when those who had as frequent opportunities as many of them had of seeing cases differed in their views he thought it meant that all cases did not run along parallel lines. He quoted some cases which showed that lymphadenoid goitre could clear up and need not go on to myxoedema, though it did so in certain instances. He thought it could be taken that lymphocytic infiltration to a very high degree could occur whenever there was exhaustion of epithelial tissues. Lymphadenoma might sometimes disappear, sometimes continue, sometimes go on to myxoedema or fibrosis. Rarely in these patients was any past history to be found. No surgeon saw enough of them to generalize about them. He had seen cases in which he had thought that focal

* Concluded from page 516.

infection had an important effect on the thyroid gland, and all had seen the good result that occurred when a source of focal infection was removed. He was inclined to think that this must start in some focal infection elsewhere, and, for some reason at present not understood, its emphasis was on the thyroid gland. It was one of the pathological conditions not yet solved. They could only record their observations; he did not think they ought to "romance about it too much."

Vote of Thanks

At the conclusion of the lecture Sir WILLIAM WILLCOX, in expressing the thanks of the society to Sir Thomas Dunhill, said that during the Melbourne Meeting of the British Medical Association in 1935 he had learned with what great affection and respect Sir Thomas was regarded in Australia. Since he had made his home in England he had evoked a similar affection and respect from his colleagues here. The subject of which he had treated in these masterly lectures concerned an extraordinary organ. The thyroid gland acted like a flue to a furnace, and could increase the metabolism of the body in a remarkable way. He had been impressed by the fact that toxic factors might increase the activity of the thyroid. It was important always to see whether there was any toxic focus which was acting as a cause of hyperthyroidism or as a stimulus to the activity of the gland. The thyroid gland also had a very profound influence upon the immunity of the body. Those suffering from hyperthyroidism were extremely sensitive to any infection such as tonsillitis or influenza, when the activity of the gland might be so stimulated that a fatal thyrotoxicosis resulted.

Sir JAMES WALTON said that it was only the older members of the profession who realized how recent had been the progress in the work upon the thyroid gland. It had been said that the whole of the surgical treatment of the thyroid dated from the development of the Spencer Wells forceps; but for long after that surgical treatment was limited practically to localized adenomatous growths. To-day the whole aspect had changed; great progress had been made, a large number of lives had been saved, and enormous amelioration of symptoms obtained. To Sir Thomas Dunhill more than to any other man did the medical profession owe the knowledge of what cases to select for operation. He had widened the scope of treatment, bringing in those cases of cardiac disease which a few years ago would have been pronounced hopeless.

Professor F. R. FRASER added a few words of commendation of the lectures. It was through the collection of cases around Dunhill, thanks to his successful methods of surgical treatment, that physicians like himself had had the opportunity of studying the disease and the after-history of patients.

A. F. Rizzolo (*Thèse Paris*, 1936, No. 824) states that generally speaking small-pox in the United States is of the mild form, the fatality being relatively low (0.9 per cent.). During the decennium 1921–30 there were 380,890 cases with only 3,484 deaths, as compared with a fatality of 23.1 per cent. in France among 1,573 cases during the period 1925–8. The efficacy of vaccination in North America is shown by the following incidence of small-pox in various States, according to the stringency of the vaccination laws. In ten States with a population of 32,775,000 inhabitants, where vaccination is compulsory, there are only 6.6 cases of small-pox per 100,000 inhabitants. In six States with a population of eighteen millions, in which vaccination is facultative, there are 51.3 cases per 100,000 inhabitants. In twenty-nine States with a population of sixty millions, in which there is no law on the subject, there are 66.7 cases per 100,000 inhabitants; and in the four States (Arizona, Minnesota, North Dakota, and Utah) in which vaccination is definitely discouraged there are 115.2 cases per 100,000 inhabitants. Rizzolo comes to the conclusion that vaccination should be made compulsory throughout the United States by a federal law.

SCIENCE COMES TO THE HOUSE

AN EXHIBITION IN LONDON

A small exhibition has been arranged by the Department of Scientific and Industrial Research at the Building Centre, 158, New Bond Street, London, to illustrate the application of science to building, especially domestic construction. The exhibition, which remains open until March 25, is not the usual assembly of the competing products of commercial firms, but a demonstration of the work of the various research organizations controlled by the Department or associated with it. These include, for example, the Forest Products Research Laboratory, the Water Pollution Research Board, and the various associations concerned with research into fuel, iron and steel, non-ferrous metals, rubber, paint, colour, and varnish.

Building Amenities and Noise

The National Physical Laboratory has chosen some interesting examples of contributions to building amenities. One of these is an artificial daylight window intended for rooms and corridors where little or no natural light is available. This little window, fitted with semi-transparent glass, gives a very cheerful illumination, but on turning the casement on its hinges one looks out, not on the open landscape, but on a specially shaped silvered reflector with lamps above. The laboratory is also devoting a good deal of attention to noise transmission in buildings. Propaganda against noise has in the main been directed, very properly, against street and factory noises, but with an ever-increasing population living in flats the very troublesome source of noise from "the people in the flat above" demands attention. The laboratory has devised a floating floor which deadens impact noises such as footsteps. This is a supplementary floor supported upon the structural floor by insulating rubber blocks. The device may not be immediately available for the tenants of less luxurious dwellings, but one feels that something of this kind will have to become standard practice if it is to be tolerable for people to live on the top of one another.

Water Supply and Heating

The Water Pollution Research Board is showing a process of water softening by means of base exchange materials, particularly synthetic resins. These are familiar to most people for other domestic uses, as in electrical insulators, but here, starting with a special tannin and with formalin, usually met with as a disinfectant, a resin is produced which can remove the metallic parts of any salts in water, whether calcium, magnesium, or iron, leaving the corresponding acids, which themselves are removed by a second resin made from formalin and a product obtained from coal tar. On water being passed through these two resins in succession any unwanted material can be removed and the water rendered nearly as pure as distilled water. Another device shown by this body is a filter for removing the whole of the lead in drinking and cooking water. The Fuel Research Station has an exhibit instructive in the principles of domestic heating. The radiant efficiency of the open fire is shown to depend on many factors, the most important being the recessing of the grate, the depth of the fire from back to front, the shape of the fire-brick, and the obstruction of the bars in front. Air supply to the fire has, within limits, little effect on the efficiency, but affects the rate of combustion. Efficiency is, however, very much affected by the type of fuel. The radiant efficiency of coal is said to vary from 19 to 24 per cent. and for low temperature coke up to 33 per cent. The more free-burning the fuel the less draught is required. It is also shown how the type of grate should be related to the properties of the fuel to be used.

The whole exhibition at the Building Centre suggests that a large amount of knowledge on all these subjects has already accrued as a result of scientific research, and how very much of it remains as yet unapplied.

STANDARDS OF HOSPITAL CONSTRUCTION

REPORT OF DEPARTMENTAL COMMITTEE

A Departmental Committee was appointed by the Minister of Health over three years ago to consider the costs of the construction and maintenance of hospitals, and has now issued its first report, which deals with the acute general hospital,[1] specifically the hospital provided by the local authority. The committee of fifteen, under the chairmanship of Mr. Adam Maitland, M.P., and with six medical members, heard evidence from the Ministry of Health, the various associations of local authorities and of their servants, also the Society of Medical Officers of Health, the Royal Medico-Psychological Association, and bodies representing architectural, structural engineering, gas and electricity, and other interests.

The committee soon reached the conclusion that it is not practicable to express standards in terms of cost. Building costs vary with period and locality, and there are other difficulties. The common method of computing "cost per bed" is open to many fallacies. The cost even of smaller hospitals does not vary directly with the number of beds. One hospital may have an out-patient department and another not, one may be staffed to a greater extent than another by non-resident personnel, one may be a completed institution and another planned with a view to early extension, all of which reflects itself in cost per bed. The committee therefore avoids cost figures so far as possible and discusses the respective advantages of different methods of planning and equipment.

The Ward Unit

The term "ward unit" is taken to mean a self-contained unit under the charge of one sister, comprising about thirty beds in one or more wards with associated service rooms. The committee thinks that such a ward should include at least four one-bed rooms. As to whether the remaining twenty-six beds should be in one large ward or two or more similar wards there is much to be said on both sides. The smaller wards offer greater privacy for the patients, provide opportunity for classification, limit the spread of infection, and facilitate periodical cleaning. The large ward is simple and economical to plan, easier to supervise by the nursing staff, and lends itself more readily as a rule to a good arrangement of window space. The committee is evidently impressed by the advantage of replacing the large ward by smaller wards. It recognizes that this plan may mean increased capital cost, though this need not be more than £4 or £5 per bed, and with a moderate degree of subdivision, such as the replacement of the main ward by two smaller wards, a plan might be devised which would entail no extra cost at all.

The space per bed is usually expressed in cubic feet, and this is also open to a fallacy because height is relatively unimportant in comparison with floor area and distance between bed centres. With an adequate area to each bed and sufficient distance between adjacent beds the height can be determined by considerations of proportion and amenity. The committee found general agreement among its witnesses that for convenience of nursing in acute medical and surgical wards a wall space of eight feet between bed centres is desirable. As for the total width of the ward, having regard to the traffic along the central gangway, the London County Council has ordained twenty-six feet; the Ministry of Health in 1924 recommended twenty-four feet, which would leave ten feet for the gangway. The committee's view is in favour of the greater width.

[1] *Departmental Committee on the Cost of Hospitals and Other Public Buildings. First Report: The Acute General Hospital.* H.M. Stationery Office. (1s. 3d. net.)

Operating Theatre Suite and Special Departments

More precise figures are set out for the operating theatre and ancillary rooms. It is considered that a good average provision of floor space for an operating theatre in a non-teaching hospital would be twenty-two feet by eighteen feet, for the anaesthetizing room 140 square feet, and for the sterilizing room with hand-washing facilities for surgeons and nurses 230 square feet in a single suite and 300 square feet when there are two theatres and anaesthetizing rooms with ancillary accommodation common to both. Stress is laid on the desirability of direct access from the anaesthetizing room to the theatre and of exit from the theatre other than through the anaesthetizing room.

A reception department, in which patients are received and examined before being sent to the wards is usual in municipal hospitals, and suitable dimensions are given for the waiting and examination rooms. It is considered that the out-patient practice of local authorities has not yet become standardized enough for structural standards to be put forward. Nor are the *x*-ray and massage and electrical departments suitable for the application of standards. The size and equipment of the laboratory must depend upon whether it is self-sufficient or called upon to deal only with certain classes of work, the rest being sent to a central laboratory. Some suggestions are made with regard to the administration block, kitchens and offices, dining-rooms, stores, and dispensary.

Residential Accommodation

It is considered that in an acute general hospital of, say, 400 beds residential accommodation should be found for the medical superintendent and his deputy, five other medical officers, matron, sisters, and nurses to the number of 133, and maids to the number of twenty-four. A separate house should be provided for the medical superintendent and small houses or self-contained flats for one or more married medical officers. Without such separate accommodation outside the administration block it is considered that it would be difficult to retain the right type of man in the hospital medical service. The appropriate room accommodation for married officers is indicated. Other resident medical officers may be housed in the administration block, each medical officer to have a sitting-room and bedroom, and there should be a common dining-room with serving pantry. The accommodation for the matron and nursing staff is also discussed.

Another detail of the hospital on which not always sufficient thought is expended is the mortuary block. A working rule is laid down that the average acute general hospital requires mortuary places in the proportion of 3 to 4 per cent. of the number of patient beds. A convenient arrangement is a rectangular room with a series of compartments in two or three tiers ranged along the back wall. A mortuary for twelve bodies should be of 300 square feet, and the post-mortem room, for one table, of a similar dimension.

The report embodies much interesting information elicited in evidence on the engineering, constructional, and finishing side. The best finish for the floors of wards is said to be hardwood, but a satisfactory substitute at about half the cost is thick linoleum, which should have a life of twenty years. On the subject of temperature and air change the committee had to feel its way through a multitude of diverse opinions. Consulting engineers and medical superintendents were not agreed within 5° as to the temperature for the wards, within 10° as to the corridors, and within 15° (65° to 80° F.) as to the operating theatres. On air change the opinion was even more divided, ranging between one and a half to five changes an hour for wards and between four and twenty changes an hour for operating theatres. In its conclusions the committee steers a middle course between these opinions. The experts differ over matters small and great,

even as to the quantity of hot water which might be considered a reasonable provision for different types of hospitals; but if this variety of opinion rather destroys the crispness of the conclusions it makes the report more interesting. One pays one's money and takes one's choice. And the money—1s. 3d.—is very little for the mass of information and impression which the committee has assembled.

THE CASE FOR PASTEURIZATION

POOLE CORPORATION BILL

At a meeting of the Section of Medicine of the Royal Society of Medicine, reported in our last issue (p. 518), Dr. W. G. Savage, who opened a discussion on milk as a factor in the cause of disease, made reference to the outbreak of enteric fever in Bournemouth and Poole last summer. The Poole Corporation Bill, which has been considered by the House of Lords committee, would, among other things, provide for the compulsory pasteurization of milk for human consumption. Dr. R. J. Maule Horne, medical officer of health for Poole, has prepared a memorandum on that part of the Bill which deals with this important problem (Part IV, Section 21, Poole Corporation Bill, 1937). Dr. Horne writes:

"A national campaign for improvement of nutrition is at present prominently before the country. An important feature in nutrition, especially for the young, centres on the consumption of milk. But milk should be both 'clean' and 'safe,' if it is to be considered a factor in nutritional progress, otherwise, as the Government's Advisory Committee on Nutrition has said, 'Milk is a medium through which disease may be conveyed to man.' Scientifically, only 'clean' milk can be made 'safe.' . . . It is the submission of the promoters . . . as a body who have the public health as their special charge that efficient pasteurization of milk provides the best known, most immediately practical, and least prejudicial method of rendering the fluid reasonably safe, from a bacterial point of view, for human consumption."

In the past allegations have been made that the pasteurization of milk, far from protecting against disease has, in fact, been the cause of it. On investigation of such statements it has always been found either that the pasteurizing process in question was not efficient or that the introduction of infection was due to some avoidable factor subsequent to pasteurization. For this reason the Bill would give the local authority power to refuse to grant licences unless satisfied that the heating apparatus meets with the requirements of the Ministry of Health, and it will also control by by-laws the utensils for storage and the methods of delivery of the milk. The need for a safe milk supply was discussed by the Representative Body of the British Medical Association at the Annual Meeting in Oxford last year, following a recommendation from the Council of the Association that only milk complying with the conditions required for the designations "tuberculin-tested" or "pasteurized" could be safely consumed without boiling.

Milk-borne Infections

Dr. Horne goes on:

"It can only be the possession of the well-known characteristic of the ostrich which makes it possible for the British Dairy Farmers Association to accept without qualification the statement made at their general meeting in 1933 that it was 'medical humbug' to make out that bovine tuberculosis could be transmitted to human beings, and that 'all this talk about the risk of contracting tuberculosis by drinking milk from tuberculous cows is rot.'"

Recently Dr. Ernest Ward, president of the Society of Medical Officers of Health, pointed out that 2,000 to 2,500 persons, mainly children, die in this country each year from tuberculosis of bovine origin, and that twice that number are made seriously ill; and that apart from tuberculosis there are many epidemics that owe their origin to the consumption of unsafe milk. There have, in fact, been about one hundred outbreaks of milk-borne epidemics in the last thirty years. In 1924 fifty-seven cases of paratyphoid fever were notified in the borough of Chorley in the months August–September. The infected milk supply was stopped on October 1, and no further cases appeared. A similar outbreak on a larger scale affected 166 persons in Hertfordshire in 1927. More recently, in March, 1935, there was an outbreak of milk-borne scarlet fever at Denham, and in August–September of the same year in Chelmsford and Chelmsford rural district there were 487 cases of scarlet fever with six deaths, the infection coming from raw milk supplied by one farm, where eight employees were found to be in an infective condition.

Poole, Bournemouth, and Christchurch suffered from an outbreak of milk-borne infection in August last. About 900 persons were affected with typhoid fever, of whom about 400 were temporary visitors on holiday in Bournemouth and the surrounding districts. There were fifty-one local deaths from the infection, which was due to raw bulked milk infected by a focus which is at present the subject of investigation by the Ministry of Health. The outbreak was checked as soon as the infected milk was pasteurized. After visiting the district Sir Kingsley Wood, Minister of Health, said: "Pasteurization immediately cut the outbreak short and it has since run a normal course, and can now, as I have said, be regarded as over. The outbreak illustrates once again the difficulty of ensuring, otherwise than by pasteurization, a safe milk supply where the milk is derived from many sources and pooled before distribution."

Finally, there has been the outbreak of scarlet fever at Doncaster in December of last year; 186 cases were notified and there were three deaths, all directly due to infection of raw milk by a dairy worker with tonsillitis (*Journal*, January 2, p. 26).

In Poole itself the fact that only pasteurized milk is authorized for use in schools under the authority of the local education committee, and for mothers and infants supplied under the maternity and child welfare scheme of the borough, has already done much to pave the way for the general introduction of pasteurized milk. The medical officer's memorandum concludes:

"The foregoing particulars of outbreaks associated with the consumption of raw milk could be confirmed by other instances of the gross dislocation of the life of a community, the untimely loss of useful or potentially useful lives, the needless heavy expenditure—the cost of the outbreak of last autumn in this district in hospitalization alone was £34,000—but the promoters hope that they have submitted sufficient evidence to show that the power sought to require the efficient pasteurization of milk circulating in the borough is reasonable and justified in the interests of the community, and that if they did not make this endeavour to safeguard their community from a recurrence of their recent tragic experience they would be guilty of an almost criminal neglect of a duty which, with the facilities available, they consider obvious."

Dr. Horne's memorandum is an effective summary of the case for pasteurization. The need for legislation on this problem of safe milk seems to be recognized by everyone, except perhaps the British Dairy Farmers Association. In the past, clauses relating to pasteurization have had to be struck out of Bills presented to Parliament by various local authorities. It is to be hoped that Section 21 of Part IV of the proposed Poole Corporation Bill will not meet with the same fate.

Sir Humphry Rolleston, Bt., G.C.V.O., K.C.B., has accepted the chairmanship of the medical board of the Eichholz Clinic, 204, Great Portland Street, London, in succession to the late Lord Moynihan. The clinic employs a staff of blind chartered masseurs and is administered by the National Institute for the Blind.

THE MEDICAL SOCIETY OF LONDON

ANNUAL DINNER

The Medical Society of London held its 162nd anniversary dinner on March 4, when a large number of fellows and guests were present, the president, Sir WILLIAM WILLCOX, being in the chair. After the loyal toasts had been honoured, Lord WRIGHT proposed the health of the society. It was, he said, a great honour to be present at a meeting of such an ancient society, founded as it was in 1773 by John Coakley Lettsom. The law, to which he belonged, was, owing to the fact that human nature changed but little, a stationary profession. Medicine, on the other hand, was progressive. The one was an art and the other a science. It was medical science that had made the construction of the Panama Canal possible and which had been so invaluable in the conduct of the war.

In responding to the toast Sir WILLIAM WILLCOX thanked Lord Wright for the kind words he had said about the society, to the members of which the memory of Lettsom was always green. To those who wished to know more about Lettsom he recommended the life written by Mr. Johnston Abraham, who was present with them to-night. The Medical Society of London, Sir William remarked, was almost the only medical society that did not admit women within its ranks. It was possible that this exclusion might not be maintained in the future. Reviewing the year during which he had been president, he said that the position of the Medical Society of London was to-day better than it ever had been, but the one thing it lacked was an endowment, and he hoped that admirers of the society would in time supply the necessary funds. The number of fellows was now over 600, and among them were a large number of young and energetic medical men. Sir William then announced that Dr. Arnold Chaplin had presented to the society nearly 400 engravings of famous medical men on condition that the engravings were suitably housed and catalogued. Dr. Chaplin hoped that this would form a nucleus for a large collection. On behalf of the society the president warmly thanked Dr. Chaplin for this generous gift.

The difficult task of proposing the health of the visitors was admirably carried out by Mr. J. E. H. ROBERTS, who with short biographical notes, welcomed the following: Lord Wright, Lord Burghley, Sir Arthur MacNalty, Sir Edward Tindal Atkinson, Lord Dawson of Penn, Sir Buckston Browne, Dr. Arnold Chaplin, Dr. Watson Smith, Dr. A. P. Gibbons, the presidents of kindred societies, the Medical Directors-General of the Navy and Air Force, and representatives from the *Lancet* and the *British Medical Journal*. Responding for the guests, Lord BURGHLEY said that he spoke with the trepidation most people felt when they came into contact with the income-tax collector and the medical profession. One of the most remarkable characteristics of the medical profession to-day was its great activity. Discussing the question of fitness, Lord Burghley said that other nations had stolen a march on us in the matter of physical fitness of the young, and this did not apply only to the totalitarian countries. In the excellence of our social services we had led the world, but in the matter of physical fitness we had lagged far behind. There were two problems to be solved. The first and simpler was the provision of adequate recreational facilities. The second and more difficult problem was the changing of the mind of the young people in this country. To secure the end that was desired every organization had a part to play, and the medical profession could play the greatest part of all. Sir ARTHUR MACNALTY, who also replied on behalf of the guests, said that Lettsom had anticipated many of the questions to which those responsible for the public health were devoting their attention to-day—the importance of fresh air, good food, and good physique. Referring to the activities of past presidents of the Medical Society of London, Sir Arthur told how during a cholera epidemic in 1854 Dr. John Snow had informed the vestrymen of St. James's that the water supply was at fault. The epidemic was controlled by the simple process of removing the handle from the Broad Street pump. Another president, Sir Benjamin Ward Richardson, had given in 1875 an address on the advisability of appointing a Minister of Health. Sir EDWARD TINDAL ATKINSON, also speaking for the guests, paid tribute to the medical profession for the assistance they rendered his department in dealing with medico-legal problems, and in this connexion mentioned especially Sir William Willcox, Sir Bernard Spilsbury, and Dr. Roche Lynch.

THREE YEARS OF L.C.C. HOSPITAL SERVICE

The administration of the L.C.C. hospital services, which figured prominently in the elections decided on March 4, was the subject of a long review presented at the last meeting but one of the old Council by Mr. Somerville Hastings, chairman of the Hospitals and Medical Services Committee. It was a statement, chiefly numerical, of the developments and extensions of the last three years, the "life" of the outgoing Council. Many of the facts and figures given in the review have been recorded in these columns from time to time in notes on the Council's proceedings or reviews of its annual reports.

The number of hospitals under the control of the committee—seventy-four—is the same as it was in 1933. The accommodation in these hospitals shows a slight decrease on the figure of three years ago, or, if allowance be made for certain beds temporarily unavailable owing to reconstruction works, a slight increase. This situation, at first sight rather puzzling in view of the ever-increasing demand on the hospitals, is explained in the report in the statement that side by side with the provision of new accommodation there has been a reduction in existing accommodation from two causes: (1) the modernization of existing unsatisfactory wards, entailing the partitioning of portions of them for duty rooms, ward kitchens, etc.; and (2) the necessity for reducing the number of beds in overcrowded wards, particularly as a result of the standards of bed space laid down by the Council in 1935 for various categories of patients. It is added that no patient whose admission was duly authorized was refused, or indeed could be refused. Until the accommodation is increased sufficiently to render it equal to the demand in all exigencies the pressure of accommodation on many hospitals during the winter peak must continue to be met in the only way possible—by the provision of temporary extra beds in wards.

The new accommodation provided during the last three years consists of 996 beds, and extensions are under construction or in preparation to provide a further 1,834 beds. Reconditioning schemes carried out at public health institutions allocated for use as hospitals have during the same period provided 1,038 beds suitable for chronic sick patients, and a further 1,200 beds for this class are in prospect. Of the new accommodation 323 beds are for maternity patients. In addition, as already stated in the *Journal* of February 6 (p. 294), a new hospital of 500 beds has been authorized south of the Thames (at Tooting).

Increases in Treatment and Service

The admissions to the general hospitals in 1936 numbered 173,997, an increase of 24,000 on the figure for 1933, and the attendances of out-patients numbered 778,600, an increase of over 300,000. At the special hospitals in 1936, a year of measles epidemic, the number of admissions was 57,188, a falling off on the figure for 1933, and almost exactly the same as the figure for 1932, which was also a year marked by measles epidemic. Confinements in the Council hospitals increase by more than 2,000 every year. The number in 1936 was 17,831, comparing with 11,668 in 1933. The attendances at ante-natal

clinics reached just upon 120,000, compared with 58,000 three years earlier. It is stated that there has been also a considerable increase in the attendances at the post-natal clinics. Some further figures show substantial increases in treatment and service at the general hospitals:

	Operations	Massage and Electrical Treatments	X-ray Films	Laboratory Examinations
1934	33,689	482,452	130,830	380,824
1935	37,365	544,007	169,773	441,267
1936	41,176	623,253	202,715	515,631

Among other details given in the report is an extended reference to nurses' accommodation. Since 1934 new accommodation has been provided at various hospitals for 813 nurses, and it is under construction or in preparation for 1,596 others. Each nurse has a separate bedroom and each departmental sister a sitting-room in addition. When a hospital has a training school for nurses and adequate accommodation does not already exist provision is made in the nurses' home for lecture and demonstration rooms and library.

The ambulance services, general and accident, have their place in the multiplication table. The number of persons conveyed in 1936 was 372,260, some 14,000 more than three years ago. Finally as to cost, the expenditure is given only from April to December of 1936, as the financial year runs from April to March. The capital expenditure during those nine months was £348,653, and the maintenance £4,181,129. The committee claims that while the annual cost has inevitably increased the increase has been reasonable, having regard to the extensive developments in all directions during the last three years, and that this has been possible only by constant and close supervision and effort on the part of all concerned. By the time these words are read it will be known how far the electors of London have endorsed this view.

Reports of Societies

IRRADIATION, PRE- AND POST-OPERATIVE, IN MALIGNANT DISEASE

A discussion on the value of pre- and post-operative irradiation in malignant disease took place at a combined meeting of the Sections of Surgery and Radiology of the Royal Society of Medicine on March 3, Professor GREY TURNER presiding.

Mr. W. SAMPSON HANDLEY said that of the methods of radiation he thought radium more effective in quality and subject to fewer drawbacks than *x* rays, but both agents had their field. There were not wanting sceptics who denied to irradiation any value in connexion with operations for carcinoma, but their error was most clearly seen when considering post-operative irradiation in the prevention of implantation recurrence. After describing a short series of cases he said that they illustrated the reality of the danger of implantation of floating cancer cells in the operation wound and the effectiveness of radium in dealing with the condition. If radium could destroy massive implantation recurrence it would, if applied just after operation, destroy the implanted microscopic foci. For this purpose deep *x* rays would probably be just as effective as radium and more convenient.

Implantation Recurrence

Implantation recurrence, even when considered alone, provided a wide field for the post-operative employment of deep *x* rays. There were indeed few cases in which the possibility could be excluded, and a short course of deep *x* rays should be applied to the scar after operation in all cases of gastric and pelvic malignant disease, breast cancer, and malignant glands in the neck. He never advised pre-operative irradiation except in rare cases as a possible means of converting a fixed inoperable growth into a mobile operable one, but he admitted that his decision against pre-operative irradiation was based on *a priori* grounds, and might be considered as a prejudice. Pre-operative irradiation entailed unnecessary and undesirable delay in the performance of the operation, and during the time of waiting the deep microscopic extensions of the growth, which were its most dangerous part, had time to make further advance. He believed that some who practised this method postponed operation for as long as three months on that account. The delay would not matter if it were certain that in the meantime the deep extensions of the growth were kept inactive by irradiation treatment, but the evidence was the other way. In cases treated by *x* rays only it was his experience that as a rule, while the primary growth shrank and became mobile, dissemination proceeded unchecked or only partially checked.

It was certainly very difficult even with modern apparatus and methods to convey to any considerable depth beneath the skin a dose of *x* rays lethal to carcinoma cells. To attempt the irradiation of carcinoma cells in the pectoral fascia or muscle through the whole thickness of a voluminous mamma was to impose on the method an extreme handicap; but when the breast had been removed even deeper layers, such as the intercostal muscles or the pleura, were brought within a short distance of the skin and exposed to the full force of the radiation. Again, there were certain glands—namely, the apical glands of the axilla and the internal mammary glands—which were so sheltered that he doubted whether they could be dealt with by any dose of *x* rays that the overlying skin could tolerate. The apical glands in the axilla could easily be removed and the internal mammary glands could be treated at the time of operation by interstitial radium tubes; but subject to any evidence from his radiological colleagues it seemed to him that no proof had yet been supplied that *x* rays could destroy the carcinoma cells in the internal mammary glands, and he had proved that interstitial radium was competent for that purpose. Until convinced of the equal competence of deep *x* rays he would continue to use interstitial radium for the internal mammary glands as a routine in all breast cancer operations.

A decision as between pre- and post-operative irradiation on statistical grounds would not be possible for a long time to come. The differences between individual cases of breast cancer were so enormous that large errors of sampling were inevitable. The differences in the methods of individual radiologists were at least as great, and the *x*-ray tube was still undergoing evolution. The best hope for progress in treatment appeared to lie in public education as to the vital necessity for prompt attention to suspicious lumps, in the closer study on the part of radiologists as well as surgeons of the process of dissemination, and in the adoption practically as a routine after carcinoma operations of a short prophylactic course of *x* rays at a voltage of at least 180,000.

Pre-operative Irradiation

Dr. W. M. LEVITT said that he did not think all surgeons would be as generous as Mr. Sampson Handley in conceding a case for *x* rays in the routine treatment of carcinoma of the breast. In a series of 100 cases of breast carcinoma a certain number would be well five years after treatment by surgery and a certain number would be well five years after treatment by irradiation. The identity of the individuals in the two groups would almost certainly be different. It was obvious that the factors which made for radio-sensitivity and for operative success were

widely different and even in some cases antagonistic. The factors determining operability might be termed "mainly mechanical," whereas radio-sensitivity depended upon certain obscure biological properties in the cell. It was reasonable to suppose that if these methods of treatment were combined a more or less complete summation of success might be expected. But how were they to be combined? Should irradiation precede or follow operation? How long was to elapse after the one procedure and before the other? What would be the dangers should *x* rays or radium be used? In the past, when the two methods of treatment had been combined, it was the common practice to carry out the radical operation first and to regard *x*-ray therapy as a rather doubtful safeguard following operation. Carcinoma cells required a lethal dose of irradiation, whether they were living in small colonies which had escaped the surgeon's knife or in large colonies which were clinically appreciable. Partly because of the tendency in the past to under-treat these cases, post-operative irradiation had so far produced no spectacular improvement in the published results, although the percentage of local recurrences had materially decreased. Another factor was that few surgeons sent their patients for irradiation as a routine measure.

Surgical Objections

The objection of the surgeon to pre-operative irradiation was, in the first place, that it meant an undesirable postponement of the operation, and in the second place that the progress of secondary deposits was uninfluenced by the local irradiation, though it was equally true that the progress of secondary deposits was uninfluenced by immediate surgery. Was the irradiation treatment capable of preventing the occurrence of fresh secondaries, and at what stage in the treatment? Surely the danger to the patient during this fortnight or so interval must be offset by the reduced danger of implantation at the operation. A third objection was the difficulty of conveying *x* rays to the requisite depth, but this did not hold so far as high-voltage therapy was concerned. High-voltage *x* rays were able to pass through bone almost as well as through the soft tissues.

In favour of pre-operative irradiation was the definite experimental evidence, not only that the irradiated carcinoma cells were much less likely to flourish should they be implanted in the site of the operation, but that a considerable reduction in the size of the growth followed irradiation, and this must clearly be interpreted as meaning actual damage to the tumour cells. Dr. Levitt summed up in favour of pre-operative irradiation with a reduced *x*-ray dosage and without modification of the radical operation, followed by a supplementary course of post-operative irradiation. An interval of from four to six weeks was recommended between the pre-operative irradiation and the operation. The supplementary post-operative course should be given as soon as the patient had sufficiently recovered from the operation. The post-operative field was unsuitable for interstitial radium, and with modern methods of deep *x*-ray therapy protection of deep structures was easily obtained. In pre-operative irradiation he did not think that the choice as between the two agents was important. With *x*-ray administration any anaesthetic was avoided, but, on the other hand, *x*-ray treatment was tedious and required about three weeks to complete.

Radiation Sensitivity and Resistance

Dr. G. F. STEBBING asserted that in the treatment of malignant disease irradiation had a much wider field than surgery. Many cases could be treated by irradiation for which for one reason or another surgery was unsuitable. In carcinoma of the breast he started treatment on the assumption that by irradiation alone he would be able to get rid of the tumour. Excision of the breast and adjacent structures was only performed when it was realized that irradiation by itself was not going to be successful. Pre-operative irradiation could be given for the following reasons: (1) to reduce the size of the tumour by getting rid of the most radio-sensitive cells; (2) to render the tumour more mobile; (3) to lessen the vitality of the tumour cells so that during the operation any of them which were sown on the surface of the wound had less chance of surviving to form local recurrences or metastases. In the majority of tumours there were a certain number of very radio-sensitive cells, and a very small dose of *x* rays therefore was better than none. Post-operative irradiation was only given on the assumption that the operation had left behind certain tumour cells. It was generally thought that if tumour cells were sown on the wound surface during operation they would be more rapidly and easily destroyed than cells growing in a tumour. This was unlikely to be true for cells which were in a resting state, and cells partially asphyxiated were more radio-resistant than cells forming part of a growing tumour. The only important thing was that each cell of the tumour, large or small, should receive the necessary amount of irradiation at the proper time. After a radical breast operation it was not possible to deliver to that part of the wound over the chest wall an effective carcinoma-killing dose of *x* rays without doing lasting injury to the skin. He doubted very much whether it was desirable to give any routine post-operative irradiation to the lateral aspect of the chest wall. If and when recurrences appeared in this area they could be treated by radium, which entailed little constitutional disturbance to the patient.

The position was different with the axilla, which, with the supraclavicular region, was a not uncommon site of recurrence. Here irradiation could be so arranged that every lymph gland in the region could be given a carcinoma-killing dose without causing more than a temporary inconvenience to the patient. For very superficial tumours such as local recurrences after operation applications at a few millimetres from the surface formed the best means of treatment with little discomfort to the patient. Post-operative irradiation should always be employed where it was known or assumed that carcinoma cells had been left behind. Suspected metastases even at a distance from the primary site should always be treated when they were accessible to irradiation and not so numerous as to render the effective treatment of all of them impossible.

Theoretical Conceptions

Dr. RALSTON PATERSON entered into a discussion from the theoretical point of view of the manner in which pre-operative or post-operative irradiation was likely to act. He did not think there was any substantial evidence that irradiation could in any way increase immunity or body resistance to metastatic growth. A mild post-operative irradiation might act as a temporary growth-restraining factor. This growth restraint was of undoubted value, but of no enduring importance, and did not come into the consideration of radiation as a curative agent. To be of value pre-operative or post-operative irradiation must be given in such doses as were known to produce definite lethal changes in whatever type of malignant disease was concerned. There must be no difference between irradiation used as a pre-operative measure and irradiation applied as a direct therapeutic agent. Whether in the presence of obvious disease or not it had to be given as intensively as possible. Mild prophylactic courses of irradiation were, frankly, a meaningless concept. Further, irradiation carried out before or after an operative procedure would only be of value in that type of case where it was proved to be of value when used alone.

A lesion genuinely inoperable when first seen could not be rendered operable by irradiation unless it were at the same time completely cured by that irradiation. By a process of shrinkage of growth a condition might be so altered as to appear and feel operable, but such an appear-

ance was deceptive in that damaged, though not dead, malignant cells were present. A surgeon finding himself in difficulties and unable to effect a complete removal when he had expected to do so could not be rescued from his misjudgement as to operability by his radiological colleague either by calling for radium at the beginning or asking for *x* rays later. Owing to the opening of the malignant tissue the patient's chances became less than they would have been had the case been treated as an inoperable one from the beginning. Surgical excision and radical radiation treatment must be looked upon as two independent methods. Half a treatment by *x* rays and half a treatment by radium might conceivably add together to produce a cure and be a whole treatment, but half a treatment by surgery and half a treatment by irradiation could not summate to anything at all. Each method of treatment must be very thoroughly employed so that it achieved in its own right a definite percentage of cures without leaning on the other except in so far as it was associated with it in actual clinical use.

General Discussion

Miss LOUISA MARTINDALE showed an analysis of a long series of her cases proving the value of post-operative irradiation with *x* rays. Out of sixty-six cases of breast cancer in which radical operation was followed by adequate deep *x*-ray therapy, fifty-three survived three years, forty-seven five years, and twenty-eight ten years. In some cases she had also used pre-operative treatment, but only because she had had to keep the patient waiting for a bed in hospital. Dr. DOUGLAS WEBSTER expressed the view that in breast cancer post-operative irradiation more or less doubled the value of the purely surgical result. He had also treated post-operatively cases of cancer of the cervix—mostly those in which hysterectomy had been done—and he was inclined to think again that the value of the operation result was doubled by the irradiation treatment. The value of pre-operative irradiation was most clearly shown in borderline or inoperable cases. He had seen irradiation applied to large masses of growth in the breast with the result that a frankly inoperable case became operable, and although a large mass had still been left it had not regressed. If pre-operative irradiation could do so much in advanced cases it was likely that it could do still more in milder and operable cases.

Dr. G. B. BATTEN mentioned that Mr. Sampson Handley had operated on one of his patients—a woman of 72—more than twenty-five years ago for breast cancer; the woman died five years ago, at the age of 92, without recurrence. All such operations had been followed by interstitial radium and post-operative *x*-ray treatment, not at very high voltages—185 to 200 kV. Dr. J. E. A. LYNHAM was not in accord with Dr. Paterson when he claimed a surgical conception of post-operative irradiation. Dr. Paterson's desire was to get a massive dose of irradiation into the tissues in a very short period; but it was well known that where large tumours had been given massive doses of *x* rays and subsequently microscopic section had been done a certain number of cells had been found to have survived, very often in the periphery of the mass, where the intensity of the irradiation might be assumed to be the greatest. Some of Dr. Martindale's cases went back for many years, when high voltages were not used. Surely there was something to be said for the sort of dose given in those days.

Mr. SAMPSON HANDLEY, replying, said that he thought Dr. Stebbing over-stressed the physical elements in radiation and under-estimated the importance of pathological knowledge as the guiding principle. Dr. Stebbing had suggested that Mr. Handley's method of introducing radium tubes along the borders of the mammary glands was a hit-or-miss method; on the contrary, it was a method of precision based accurately upon anatomical findings.

UNUNITED FRACTURES

At a meeting of the Section of Orthopaedics of the Royal Society of Medicine on March 2, Mr. WHITCHURCH HOWELL presiding, a discussion was held on the prevention and treatment of ununited fractures. Fractures of the neck of the femur, which have been considerably discussed, were excluded.

Mr. A. M. A. MOORE declared that the problem of non-union, which had exercised the minds of surgeons for a very long time, was as acute as ever. In conversation with other orthopaedic surgeons he had formed the view that the percentage of cases of ununited fracture was decidedly high. He proceeded to a study of sixty-five such cases at three hospitals with which he was connected in the London area. Of these cases, which extended over a period of ten years, forty-six were originally simple fractures and nineteen compound; twenty-nine of them occurred during the first half of the period and thirty-six during the second half. All of them were cases which had not united despite treatment for six months after the primary injury. It was difficult to obtain particulars of the early treatment, which had been carried out in nearly forty hospitals and other institutions. The Wassermann reaction was tested in thirty-nine of the cases and was positive in two. One patient had chronic nephritis (this was the only one in whom any urinary abnormality was found), one had rheumatoid arthritis, and one developed sclerodermia. Complete blood investigations were carried out in nineteen cases, but no positive results were obtained. It was suggested that the taking of an excessive number of *x*-ray films had a bearing on non-union, and in one case forty-five films had been made in four weeks, but in this instance he did not think the number of radiographic examinations had had any part in the result. No general factor accounting for non-union was established. Bone infection could be demonstrated clearly in nineteen of the series. Very careful attention was paid to the possibility of over-extension as a cause of non-union. Twenty out of the sixty-five cases had been treated by skeletal traction over a long period during the primary treatment, and in some of this series the radiological evidence of over-extension was clear. His impression was that whilst skeletal traction was an extremely valuable method of applying extension it had often been used without reasonable care.

Grafting Operations

Mr. REGINALD BROOMHEAD spoke in particular of reconstruction operations and their technical difficulties. In his series of cases the commonest site had been at the middle and lower third of the tibia, next came the radius and ulna, and much more rarely the humerus and the femur. There were various opinions about the method of bone grafting. One view was that a bone graft was only successful when chips were used. He did not believe that bone chips in themselves were effective in treating ununited fractures. Another view was that the graft would only take when its blood supply was preserved by having muscle attached to it; but such a graft was manifestly technically impossible for all ununited fractures in the middle of a long bone. He was strongly of opinion that if a bone-grafting operation was to be done it must be carried out as a sound mechanical proceeding, and the bone should be as large a piece as was compatible with the mechanical conditions present. The graft also must be firmly fixed. In the forearm bones, where there was no weight-bearing, the bridging of a gap was usually successful. In the case of the humerus he thought it was best to make a Z-shaped cut and to fix the ends together with two wires. Operations on the humerus were not at all easy, and in order to make a good Z-shaped cut so that there was apposition of the cut surfaces a wide exposure was necessary. It was essential to be careful with the traction because the musculo-spiral nerve was so liable to be damaged. As a first step in operation the

nerve should be exposed fully and retracted well out of the way. After describing bone-grafting of the femur—which he said was one of the biggest operations in surgery—and the tibia, he analysed the thirty-seven cases at the General Infirmary at Leeds over a ten-year period. The average age of the patients was 33. The number of operations carried out was: drilling, three; reconstruction, two; grafting, thirty-five (of which twenty-five were autogenous grafts); and amputation, one.

Bone Plating

Mr. H. A. T. FAIRBANK expressed the view that delayed union was as common as it was twenty years ago. The causes were local and not general. He did not regard imperfect immobilization as the only cause, as some people would have them believe. Want of apposition of the fragments and deficient blood supply of one of them were causes in some instances. He was old enough to have seen the old fixation—not rigid, because the splints were not very good—without regard to anything else give place to mobilization and massage, and his feeling was that the latter procedure gave just as bad results as the former. Now they had gone back to realize that rigid immobilization was an essential feature, but with due regard to the functional use of the limb when this was possible without endangering immobilization. The cases one saw nowadays of delayed union and non-union were still far too often the result of early massage and movements of the adjacent joints. Another class of cases still to be seen were those treated by open operation without a sufficient number of screws being used for the bone plated and also without adequate external splintage. A plated fracture required just as much care in splintage, and for the same length of time, as a fracture which had not been operated on. Personally he could not help feeling that the pendulum had swung rather too far from open operation in earlier cases, which, after all, should give perfect results. Malposition of the fragments was very important. He had seen cases which on being exposed three to five months after the injury showed practically no change whatever, or merely a suspicion of the rounding off of the sharp ends, but when the ends were put in position and plated there was no trouble about joining up. He shared Mr. Moore's view that it was a mistake to let students leave hospital with the idea that skeletal traction was a routine method of obtaining extension when this was necessary. With regard to the femur it was a good plan to plate as well as graft. He had done this several times, and had no reason to regret it.

Vascular Supply

Mr. G. R. GIRDLESTONE said he himself had passed through two periods in dealing with cases of non-union. His change of mind or repentance dated from a troublesome case of a healthy undergraduate with a fractured femur showing a very obstinate condition of non-union. A great deal of splintage was done, the patient underwent four operations, including plating and grafting, and he was made to walk on a calliper, but for about two years the bone refused to unite. The secret in that case, as he thought in other difficult cases, was the factor of blood supply. When one or both ends of the bone were anaemic a difficult condition was presented. In a case of obstinate non-union it might be best to stop worrying it for the time being, to fit up some splint which allowed ambulatory activity if a lower limb, or action of the hand if an upper, and to tell the patient to go away and forget about it and come back in six or nine months. The principles of treatment were: (1) immobilization without circumferential pressure; (2) end-to-end intermittent strain; (3) a good blood supply. The last was the one thing that would save amputations and failures. It might be a necessary part of the operation to provide the blood supply with a path. At Oxford a point had been made of never raising the ends of the bone from their vascular bed in any operation for non-union. Sclerosed fibrous tissue was taken out and channels of vascular supply opened up. Grafting was done by the inlay method, by osteo-periosteal grafts, and by chip grafts. But the most important thing of all was to open up the blood channels.

General Discussion

Mr. K. H. PRIDIE said that there was an inverse ratio between the cross section of bone and the time taken to unite. In transverse fractures there was a call for patience and for immobilization for sufficient time until consolidation occurred. In 80 or 90 per cent. of tibial fractures he put on traction by means of Kirschner wire and reduced it and the wire was out in twenty minutes. He had never used a bone plate; he did not think it necessary. In the case of a young person with a fracture where there was good apposition but non-union at the end of three months he thought matters should be anticipated and multiple drilling be done through a minute tenotomy wound, putting the patient in adequate plaster, which must come up to the tuberosity of the ischium, for a further three months. He had found that he could get good union in that way.

Mr. MCCRAE AITKEN said that the causes of failure to unite were non-apposition and movement, and the worst movement was rotation. The failure to unite was seen most often in the transverse fracture, especially in the humerus, when there was frequently a stiff elbow as well, and in the lower third of the tibia because the foot had not been properly fixed and the astralagus inverted. Mr. ERIC LLOYD described half a dozen cases of non-union. One was in a man of 20, in whom there had been non-union for two and a half years. He carried out the usual drilling operation as described by Böhler, and seven months after operation the bone was clinically and radiologically united. Another case was a man of 24 with non-union for one year and five months. He had been treated elsewhere with 35 lb. of skeletal traction for five weeks. He underwent the same operation and walked next day in his plaster, and four months later there was union and the plaster was discarded.

Mr. B. H. BURNS had been unsuccessful with wire. Whenever he had put wire into a fracture he had always noticed that in the neighbourhood of the wire non-union occurred. He had been startled by Mr. Fairbank's advocacy of steel plates. In his experience, in an area where these had been put on union did not take place, and where union did take place eventually it was in an area furthest removed from the plate. Mr. NOEL ST. J. BUXTON referred to the after-history of twenty-four cases of non-union or delayed union of tibia and fibula which he had dealt with in eight years. He had circularized the patients and had heard from the greater number. All had exactly the same operation—a bone graft, the ends exposed, sclerosed bone cut away—and he never used any wire or plate. Not one of the patients had had any treatment since the graft except splintage. All were satisfied, though two complained of bad ankles.

Dr. DUNCAN WHITE believed that ununited fractures now were more common than twenty years ago. Absolute and complete immobilization had something to do with it. The question of excessive *x*-ray examination as a contributory cause might be dismissed. Even the forty-five films in four weeks mentioned by the opener of the discussion could have had no bearing on the question of union. Mr. WHITCHURCH HOWELL said that there were a certain number of cases in which no union would take place until an operation was done. These were often due to interposition of fibrous tissue, perhaps periosteal, between the ends. No amount of drilling would cure this, and a massive, wide, and long bone graft, with stripping of periosteum up and down the shaft to a very considerable extent, with free eversion of the two ends of the bone, would give the best result. Lately he had been using a much wider and deeper saw, specially made, and his results had considerably improved. Metal must be used sometimes, but the more he saw of these cases the less he used it. Occasionally it was necessary for the

temporary plating of a compound fracture in order to save the limb. If metal must be used the stainless variety of steel was certainly the best.

Mr. BROOMHEAD, in replying on the discussion, mentioned that people who were particularly tall tended to be much longer in uniting than did people of average stature; also in multiple fractures the tendency was for union to be rather delayed, as though there were some substance in the body which had to do with bony union and which expended itself in producing a tall person and was inadequate to cope with the multiple fractures so often seen nowadays. As to the supposed increase in the number of non-unions, it must be remembered that the total number of fractures was greater, and naturally the number of non-uniting cases also increased, but he did not think the proportion was greater.

SIGMOIDOSCOPY IN TROPICAL PRACTICE

At a meeting of the Royal Society of Tropical Medicine and Hygiene on February 18, with the president, Sir ARTHUR BAGSHAWE, in the chair, papers on sigmoidoscopy in tropical practice were read by Dr. P. MANSON-BAHR and Lieut.-Colonel A. G. BIGGAM.

Dr. MANSON-BAHR said that a knowledge of sigmoidoscopy as a means of differentiating the various forms of dysentery from each other, as well as from other diseases of the large intestine, was invaluable to the tropical physician. In the Tropics sigmoidoscopy had hardly received the attention it deserved, especially in the diagnosis of the various stages of amoebic dysentery. For the true appreciation of the minor changes in the mucous membrane, as viewed with a magnifying eyepiece, a knowledge of the normal appearance of the mucous membrane of the rectum and sigmoid was essential. After describing the valves of Houston and Nélaton and the recto-sigmoidal sphincter, he drew attention to the openings of the racemose mucoid glands situated immediately above the internal sphincter, not to be confused with the small depressions or "pits" so often seen as the result of chronic amoebic ulceration.

The account of amoebic dysentery lesions as seen by sigmoidoscopy had been compiled from a study of 183 cases of proven amoebiasis, in which either the active forms of *Entamoeba histolytica* or its cysts had been recognized in the faeces. The acute stage or a surface infection with the amoebae producing a superficial excoriation as seen in the artificially produced disease in cats was seldom observed in man. He had seen three cases in which there was a contused or bleeding granular surface resembling that of ulcerative colitis; in these it was easy to demonstrate the organisms in large numbers in scrapings obtained by a Volkmann spoon from the diseased surface. In one instance the amoebae had been found in the blood-and-mucus stool passed before examination. In amoebic dysentery the earliest lesions observed were small yellow elevations or papules, which represented undeveloped ulcers; later these appeared as small red depressions with haemorrhagic margins. The mucous membrane in between the individual ulcers was folded or ridged, and it was of a pale yellowish-pink colour. Usually small petechial haemorrhages were seen dotting the surface. Occasionally large solitary ulcers up to 1 cm. in diameter were discovered, and might be so indurated as to simulate a malignant ulcer, but amoebae could be found in scrapings from the ulcerated surface. Attention was also drawn to amoebic granuloma, or the hyperplastic form of lesion, which closely resembled carcinoma and had been well described by American observers. In chronic amoebic dysentery, when *E. histolytica* cysts were present in the faeces, the lesions in the rectum were not so easy to detect. The ulcers were often represented by minute depressions or "pits," giving a "pock-marked" appearance, and could only be detected with a magnifying eyepiece. These pittings really represented the scars left by the ulcers in the more acute stage, and their development could be traced by observing the healing of ulcers under specific treatment with emetine. The response to emetine and emetine-bismuth-iodide was remarkable; the ulcers granulated with extraordinary rapidity, and all traces might disappear within ten days from the initiation of specific treatment. The sigmoidoscopic appearances of chronic bacillary dysentery were, as a rule, difficult to distinguish from those of certain stages of ulcerative colitis. The inflammatory process permeated all the layers of the bowel wall. The chief features were the partial stenosis and the spongy and easily traumatized mucous membrane. These cases were more frequently met with as the result of infections contracted in the great war, and were now more rare. The serum-agglutination test afforded a further diagnostic measure. In doubtful cases of sprue sigmoidoscopy was also of value. In the acute stage the mucous membrane was of a rose-red colour, and the typical light-coloured faeces could be seen in the upper part of the rectum; in the later stages it was pale yellow and parchment-like.

Lieut.-Colonel A. G. BIGGAM illustrated his remarks with coloured paintings made from actual cases by Mr. Strekalovski, and with a series of microscopical preparations. If, he said, a case of bacillary dysentery was seen early an accurate diagnosis could usually be made by cytological examination of the stool or by isolation of the causative organism. Later laboratory investigation was frequently of little help. In such cases the visual examination of the mucous membrane just inside the sphincter afforded a view of the mucosa adequate for identifying the type of infection. In amoebic ulceration the characteristic sigmoidoscopic appearances were the discrete nature of the ulcers and the healthy intervening mucous membrane, in contrast to the diffuse inflammation of a bacillary infection. In very debilitated subjects amoebic dysentery might clinically simulate an acute bacillary dysentery infection. In them the identification of small islands of healthy mucous membrane persisting between areas of extensive ulceration would give the clue to the diagnosis. The course of an amoebic ulcer could be followed by repeated examination. Under specific treatment complete healing was the rule, the mucous membrane reverting to its normal condition.

With regard to malarial colitis, he emphasized that in subtertian malaria there might on occasion be acute dysenteric symptoms indistinguishable clinically from those of bacillary dysentery. The sigmoidoscopic appearance of the mucosa varied from patchy hyperaemia to scattered haemorrhages and areas of superficial necrosis. These lesions disappeared rapidly after adequate quinine treatment.

In endemic areas of schistosomiasis symptoms caused by infestation with *S. mansoni* might give rise to an erroneous diagnosis of amoebic or bacillary dysentery. Differentiation could be readily effected by employing the sigmoidoscope. The earliest recognizable change was a patchy hyperaemia of the mucosa. In these patches small more intensely hyperaemic areas, not elevated above the surface, could be discerned in the mucosa. As the disease progressed these areas became elevated, finally to form polypoid masses. Later still degenerative changes led to ulceration of these papillomata. Under treatment by tartar emetic the early lesions rapidly subsided; if, however, they had progressed to the polypoid stage resolution did not occur. In this type of case dysenteric symptoms might persist for years. Many of these polypi could be removed through the sigmoidoscope by electric cautery or diathermy.

Discussion

Dr. C. C. CHESTERMAN was particularly interested in the type of papillomata produced by the terminal spined

eggs of *S. haematobium* in the bowel. In the Congo he had never noted anything like that in infestation with *S. intercalatum*. All that sigmoidoscopy showed in infestation with that schistosome was reddening and a sandpaper appearance in the lower bowel; polyps had never been observed.

Dr. N. HAMILTON FAIRLEY pointed out that preparation for sigmoidoscopy involving the use of aperients and cleansing enemata might alter the appearance of the mucosa. If the mucosa bled on swabbing that was good evidence of inflammation. Sigmoidoscopy was of value in determining non-tropical causes of blood and mucus in the stools, and it should be remembered that carcinoma sometimes coexisted with either active or latent amoebiasis. In the absence of cellular exudate in the stools sigmoidoscopy rarely yielded positive findings of tropical interest. The usual sigmoidoscopic pictures were well known. Rarer forms included amoebic granuloma of the rectum or colon, readily confused with carcinoma, and amoebic proctitis with more or less uniform involvement of the human rectum similar to that described in experimentally infected kittens. In his opinion chronic bacillary dysentery was rarely met with among Europeans from the Tropics; when it did occur it was impossible to distinguish it sigmoidoscopically from the chronic ulcerative colitis of temperate climates. Bacillary dysentery was a self-limited disease which killed or cured, and examples of so-called chronic bacillary dysentery among prisoners of war and inmates of gaols in India probably originated from multiple reinfections over long periods.

Dr. GOLDBERGER said that proctosigmoidoscopy should be practised as a routine procedure by every physician investigating bowel trouble. He then described his special instrument, which by means of a telescope gave a magnification of some ten diameters. It was particularly suited for strictures, and could be passed as far as 35 cm. up the bowel. By attaching a tube and using water pressure it was possible to clease the bowel of blood and mucous exudate during the examination.

Dr. MANSON-BAHR, in reply, said that definite puckering of the bowel did sometimes follow the healing of extensive amoebic ulcerations. That was the only point on which he was at variance with Colonel Biggam.

BIOMICROSCOPY OF THE FUNDUS OCULI

A meeting of the Royal Medico-Chirurgical Society of Glasgow was held in the eye department of the Western Infirmary on February 19, with the president, Mr. G. H. EDINGTON, in the chair. Professor A. J. BALLANTYNE read a paper on biomicroscopy of the fundus oculi.

He said that ophthalmoscopy was essentially a branch of microscopy, for with the ophthalmoscope they examined structures which were more or less transparent under varying degrees of magnification and with various forms of illumination. Since there were many lesions of the fundus which it was difficult or impossible to explain by histological methods, it was all the more necessary that every refinement of ophthalmoscopy which made the ophthalmoscope a more perfect microscope should be employed. The communication was designed to show how this purpose could be served in two ways—namely, by focal illumination of the fundus and by the use of filtered or selected light. In the biomicroscopy of the anterior segment of the eye focal illumination was employed in five ways: by direct illumination; by lateral or proximal illumination; by retro-illumination; by examination in the zone of specular reflection; and by examination in optical section. Within certain limits these methods all had their application in the examination of the fundus oculi. The modern interest in the examination of the fundus with selected or filtered light dated from Vogt's employment of an approximately red-free light to demonstrate that the yellow spot was not merely a post-mortem phenomenon, but could be seen in the living eye. In many other ways the view of the fundus obtained with the red-free light differed from that obtained with the mixed light of the electric bulb, and for most purposes the light of the mercury vapour lamp was a good substitute. An entirely different picture resulted from the use of a sodium vapour lamp. This lamp provided a bright monochromatic yellow light, which enhanced the definition of fundus details. Clear definition was further assisted by the fact that the vessels stood out darkly against a pale background. Surface reflexes were abolished and the retina was rendered more transparent. Hence deep-seated lesions, especially in the choroid, were more easily seen. The advantages of focal illumination and of examination with selected light could be obtained without costly apparatus.

Dr. JOHN MARSHALL gave a lecture-demonstration of the various types of appliances—magnifying glasses, binocular magnifiers, telescopic spectacles, and contact glasses—which could be used to improve the vision in amblyopia, arising from such conditions as retrobulbar neuritis, central choroidal degeneration, partial cataract, and conical cornea. There was a full display of the appliances.

Nystagmus

Dr. I. C. MICHAELSON discussed nystagmus. He described the postural reflexes which controlled the automatic movements of the eyes; the purpose of these reflexes was to maintain the eyes as long as possible in the same position relative to the visual field. The different stimuli for these reflexes arose in the retina, the proprioceptive system, and in the semicircular canals. Physiological stimulation of the last-named produced a nystagmus with a slow component designed to maintain the relationship of the eye and the visual field, and a quick component which was the result of supranuclear stimuli from the cerebrum. Pathological nystagmus was described as being ocular, vestibular, or central nervous, according as the aetiological factor which impinged on the physiological reflex was disease of the eye, ear, or central nervous system. The pathological anatomy, clinical features, and differential diagnosis of the various types of pathological nystagmus were discussed, including that found in disseminated sclerosis.

PLACENTA PRAEVIA

At a meeting of the Edinburgh Obstetrical Society on January 13, with the president, Dr. DOUGLAS MILLER, in the chair, Professor JAMES HENDRY of Glasgow and Professor DUGALD BAIRD of Aberdeen read a paper on the treatment of placenta praevia.

They reviewed first the opinions expressed at a meeting of the society in 1925, when the same subject was discussed. Caesarean section was then thought suitable for a few hospital cases, but vaginal methods of controlling haemorrhage and effecting delivery were given first place, and no reference was made to the importance of making up the patient's blood loss. From the consideration of large series of cases collected by various workers there appeared to be a uniform international standard of maternal mortality for this complication in the neighbourhood of 7 per cent. Limited series had been reported showing a much lower mortality, and the speakers felt that much better results could be obtained.

A series of ninety fatal cases of placenta praevia occurred in the Glasgow Royal Maternity Hospital within the period 1925–34. Death was due to haemorrhage in fifty-four cases and sepsis in thirty-six cases. Two groups were recognized: (*a*) those arriving in hospital in good condition, and (*b*) those arriving in poor condition. The mortality was higher in the latter; it also increased with the degree of placenta praevia.

The following recommendations suggested themselves to the speakers. (1) If possible every case of placenta

praevia should be dealt with in a maternity hospital or well-equipped nursing home, but a blood transfusion should be given in the patient's own home before she was removed if she was already collapsed: for this purpose a mobile blood transfusion unit should be organized. (2) The importance of warning haemorrhages should be more fully appreciated. (3) All cases of ante-partum haemorrhage should be examined vaginally only under circumstances which allowed of efficient treatment being carried out at once, and then only by a person qualified to carry out such treatment. (4) The blood loss must be replaced by blood transfusion. (5) Caesarean section should be considered far more often, as it offered a very satisfactory form of treatment. (6) The successful treatment of placenta praevia required the co-operation of the general practitioner and the hospital staff. The speakers suggested that if due attention was paid to these points a relatively small number of cases would in future be classified as "unavoidable deaths."

Caesarean Section

During the last six years 228 cases of placenta praevia had been treated in Professor Hendry's unit, with a maternal mortality of 2.7 per cent. For patients admitted in good condition and in whom the placenta did not reach the internal os, puncture of the membranes was carried out. Occasionally in such a case if bleeding had ceased and the child was very premature expectant methods were sometimes adopted. Where the placenta praevia was central, or the placenta partially covered or reached down to the edge of the internal os, Caesarean section was performed in practically every case—expectant treatment was never considered. The number of cases treated by Caesarean section had risen to 64 per cent. during 1936; the more frequent use of this operation had been made possible by blood transfusion, so that women arriving in poor condition could be safely operated on. An efficient blood transfusion service had been established, most of the 200 donors living near the hospital.

Vaginal packing had been discontinued, except in grave emergencies. Practitioners were encouraged to send all cases of ante-partum haemorrhage into hospital for diagnosis without themselves making a vaginal examination; a blood transfusion was given before any such examination was made if the patient's condition was unsatisfactory. Version was only used in eight cases in which the vagina had been packed before admission. During the last two years eighty-seven consecutive cases of placenta praevia had been dealt with on the lines described with only one death—a mortality of 1.1 per cent.—this death was due to the giving of incompatible blood. The foetal mortality rate in this series was 43 per cent.; where version was used it was 81 per cent.; where the membranes were ruptured, 32 per cent.; and following Caesarean section it was 30.2 per cent.

One hundred women who had a Caesarean section performed for placenta praevia more than two years previously were re-examined, so as to estimate the end-results. In ninety no abnormality was found and their general health was good. In only three symptoms referable to the operation, probably due to adhesions, were present. Fifty-four of the patients had been sterilized at operation, as many of them were over 40 years of age and considered they had large enough families. Of those not sterilized it was calculated that there was a sterility rate of 8.7 per cent. A group of women who were treated by vaginal methods in the same years as those who had Caesarean section were examined as to end-results: 15 per cent. were found to be in poor health, and the sterility rate was calculated at 18 per cent. From this it seemed that the end-results of Caesarean section compared very favourably with those of the vaginal methods of treatment, and the dangers of sterility and rupture of the uterus in a subsequent pregnancy or labour were probably not nearly so great as had been thought.

Local News

SCOTLAND

Appointment to the Department of Health

The Secretary of State for Scotland has appointed Dr. James Macalister Mackintosh to be Chief Medical Officer of the Department of Health for Scotland in succession to Dr. J. L. Brownlie, who retired last November. Dr. Mackintosh, who was born in 1891, was educated at Glasgow High School and the University of Glasgow, where he graduated M.A. in 1911 and M.B., Ch.B. in 1916; he proceeded to his M.D. in 1923. In 1920 he took the diploma of public health of London University, and later became a barrister-at-law of Gray's Inn. During the war he served in France first as a combatant and later in the R.A.M.C., and after the war became for a time medical officer to the Ministry of Pensions. Devoting himself to public health, he became assistant medical officer of health for Dorset, and in 1924 assistant medical officer of health for Burton-on-Trent, where he organized an orthopaedic scheme. Later he became deputy medical officer of health for Leicestershire and in 1930 medical officer of health and school medical officer for the county of Northampton. Dr. Mackintosh has taken much interest in movements associated with the promotion of public health, being chairman of the Propaganda Committee of the British Social Hygiene Council, and a member of the Central Council for Health Education and of the executive of the Association for Mental Welfare and Child Guidance.

Glasgow Maternity Hospital

Glasgow Royal Maternity and Women's Hospital has received a gift of £25,000 from Mr. Archibald Walker, who has been a director of the hospital for over fifty years and who retired from the chairmanship last year. Professor D. M. Blair of the chair of anatomy at Glasgow University, speaking at the annual meeting of the hospital, said that this institution was the largest of its kind in the British Isles. The statement which had recently been made in the House of Commons that the maternity hospital service was a matter of sending out untrained students to look after women in confinement was an entire misrepresentation. The students were well-trained final-year students, who had behind them the entire medical staff of the hospital, and if any student was unable to cope with a case he could call upon the qualified medical staff, who again might call upon the visiting or consulting staff if necessary. The usefulness of this system was shown by the fact that in the last five years there had been only twelve maternity deaths per annum, giving a total rate of 0.5 per 1,000. The speaker also referred to the blood transfusion service, which had affected the vital statistics of the hospital, and to the necessity for the hospital to play a part in increasing knowledge of obstetrics by research work. A study had been made here regarding certain lesions of the pituitary gland, which had been found with unexpected frequency. This was a new disease, which seized women just after childbirth and led to an extreme degree of malnutrition, enfeeblement, and ultimately to death. Six cases had been identified by the director of research in the past six months, and this suggested that it was much less rare than was previously thought. Further study would probably lead to the discovery of a successful form of treatment.

Dr. P. Mauriac, dean of the medical faculty and professor of clinical medicine at Bordeaux, has been nominated corresponding national member of the Académie de Médecine, and Dr. J. Verhoogen of Brussels and Professor Davide Giordano of Vienna foreign corresponding members of the Académie de Médecine.

ENGLAND AND WALES

Cardiff Corporation Fracture Service

We have received from the medical officer of health of Cardiff (Dr. J. Greenwood Wilson) a pamphlet on the Cardiff Corporation Accident Service, of which he and Dr. A. O. Parker of the Prince of Wales Hospital, Cardiff, are the authors. The service is believed to be the only one of its kind under municipal control, and it is claimed as a good example of what may be done with existing local resources without embarking upon new and costly schemes of building and equipment. The Corporation has opened at City Lodge, which was formerly a Poor Law institution, a self-contained fracture clinic. Under the same roof, though with a separate entrance and with a different medical and surgical staff except for the visiting consulting surgeon, is a new central orthopaedic clinic. The fracture block consists of a reception room, a massage room with six treatment cubicles, and a plaster room with a portable *x*-ray apparatus. There are eight beds which are available for short-stay cases. On the acceptance of a patient for treatment a general and *x*-ray examination is made, and should fracture be diagnosed the displacement is reduced. Whenever possible the patients are allowed to go to their homes and are given an appointment to attend the clinic for after-care. Cases which require hospitalization are transferred from City Lodge, which is in the centre of the town, to Llandough Hospital, an appropriated public health municipal hospital three miles away. The patient's private practitioner is notified of the diagnosis and acquainted with the treatment that is being carried out. It is said that practitioners make increasing use of the fracture clinic and readily refer their patients for treatment and after-care. During the first twelve months of the service the total number of accident cases treated for the first time was 673 and the attendances were 2,917. Of the fractures and dislocations 270 were of the upper extremity and the clavicle, and 156 of the lower extremity. The total cost of the service for eleven months from the opening in September, 1935, was £2,492, and for the last five months of that period, during which an almoner had been at work, £789 was recovered.

Guy's Hospital Dental School

The annual clinical meeting of Guy's Hospital Dental School, said to be the largest gathering of its kind in the Empire, was held on March 6, and attracted, as usual, several hundreds of former students who came to renew old acquaintance and to watch demonstrations of modern procedures by members of the staff. In two theatres operations for dental cyst and other procedures of dental interest were carried out by surgeons of the school, and in the anaesthetic rooms of the out-patient department there was a demonstration of anaesthetics. The prosthetic and dental research laboratories, the denture room, and the children's department (the last given up to an exhibition of orthodontic cases and appliances) were full of eager groups. In the large conservation room, which accommodates more than seventy dental chairs, demonstrations were given on gingivectomy, root canal treatment, preparations for bridge abutments, speech training, facilitation of extractions using the impactor mallet, apicectomy, and practical applications of tooth carving. In the *x*-ray room radiographs showing representative pathological conditions were exhibited, and in the denture room there was a display of impression technique and denture design. At a semi-public luncheon the dean of the school, Professor T. B. Johnston, who presided, expressed the view that in the next eight or ten years there would be a large increase in the openings for members of the dental profession, and the number of students at present coming forward would not be sufficient to fill them. The Government plans for physical training, the demands of the Services (where the most fruitful cause of rejection of recruits was caries in some form or other), the obvious desirability that the work done by the school dentist should be continued after school—at least until the young person entered national health insurance, when he might or might not come under dental benefit—and generally the new awareness of dental health on the part of the community, all pointed in the same direction, and meant that the present 7,000 qualified dentists would not be enough to meet national requirements. A call for an increase in the number of dental students would not necessarily advantage Guy's Hospital, which was limited in the number it could take; moreover, its dental students must be rather fewer than its medical students. An increased number of applicants, however, might perhaps enable the school to be a little more selective in its admissions. The visitors were then taken round the school by Mr. Bocquet Bull, the sub-dean, and Mr. W. E. Herbert, the director of the department of conservative dental surgery. Extensive as the premises are, the accommodation is overtaxed, and a scheme of replanning will have to be undertaken during the next few years. From small beginnings just over fifty years ago it has grown to a department with 114 dental chairs in constant use and about 100,000 attendances of patients annually. The total number of students in the school is a little over 300, of whom about 130 are senior students working in the conservation room. It is the school's boast that about one-quarter of the dental practitioners who qualify in this country are Guy's men.

Rescue Work in North London

The good work which is being done by the Children's Moral Welfare Committee—now also styled "Rescue and Preventive"—for the boroughs of Holborn, St. Pancras, and Hammersmith has already received comment in these columns (*Journal*, 1936, **1**, 484). The committee's eleventh annual report shows that during last year it dealt with a considerably larger number of cases, nearly all the increase being in preventive work, in which, it believes, it is most accurately fulfilling its function. On the other hand, less follow-up work has been possible and a smaller number of cases have been carried forward. An after-care helper is necessary to release the present worker for more of the earlier rescue and preventive activities which she whole-heartedly carries out on the committee's behalf. Outside adult rescue workers have been appointed in Holborn and St. Pancras, and some of the after-care work of the committee has already been turned over to them. In several of the year's cases it has been necessary to reorganize the family life of the child, and the committee has been able to secure a change of environment and a holiday for a whole family instead of sending the child away alone. Of the 159 cases dealt with, thirteen children were placed in homes, twenty-two were referred to other agencies, forty-five were visited and advised, and fifty-nine are under supervision. The case records, however, do not show the wide educational aspect of the committee's work and the extent to which it fosters a true preventive outlook. It is representative, happily, of a large and increasing number of moral welfare committees which perform this invaluable work in London and the provinces. Copies of the report may be had from the honorary secretary, Miss T. M. Fagan, 7, Ampthill Square, N.W.1.

The annual malaria control course for laymen (engineers, planters, etc.) will be held at the London School of Hygiene and Tropical Medicine, Ross Institute of Tropical Hygiene, Keppel Street, Gower Street, W.C., from June 21 to 25, under Sir Malcolm Watson, director of the Ross Institute. The course includes instruction on mosquitos and their habits, drainage and other measures for the prevention of malaria, and an address by Dr. G. P. Crowden on "Insulation against Heat and Cold." The course is free, and full particulars may be obtained from the organizing secretary at the Institute. Applications should be sent to him as early as possible.

Correspondence

Royal Medical Benevolent Fund Centenary Appeal

SIR,—It may be of interest to your readers to have a brief summary of the results up to December 31, 1936, of our special centenary appeal.

During April, 1936, we posted to 44,694 medical practitioners (at a cost of £590 16s.) an appeal signed by Sir Thomas Barlow, president of the Fund, together with a historical review of the hundred years' work of the Fund, compiled by Sir Humphry Rolleston. The Centenary Fund was opened by the very generous lead of Sir Thomas Barlow, who made a gift of £1,000, which has been followed by 596 donations amounting to £3,570 11s. 7d. It was noted that of these 596 donations no fewer than 337 were from subscribers who already gave annual contributions and only 259 donations were from those who had not previously supported our benevolent work. In addition to the above, after the dispatch of the 44,694 appeals, 117 practitioners signified their wish to become annual subscribers to the amount of £149 10s., and a few old subscribers increased their subscriptions, adding a further £23 12s. to our annual income.

The administrators of the Fund felt that the response from the profession as a whole had been somewhat disappointing and consequently decided to send out a reminder to the appeal. In November, 1936 (at a cost of £65), 6,523 letters were posted to practitioners in the postal districts of London who were known not to be subscribers to the Fund, and each was asked for a small contribution, such as an annual subscription of 5s. To this appeal 286 replies were received, of which 220 had signed bankers' orders, thereby becoming annual subscribers of a further £101 5s.

Our committee has decided to keep the Centenary Fund open until April, 1937, when the centenary year will have ended. A reminder is being sent this month to every practitioner in England, Scotland, and Wales who has not yet responded to the appeal. We earnestly beg those of your readers who are not already subscribers to fill in the banker's order for 5s. as soon as they receive this final appeal, which will reach them in the course of the next few days.—We are, etc.,

D'ARCY POWER,
Chairman of Committee.
LEWIS G. GLOVER,
Honorary Treasurer.

11, Chandos Street, Cavendish Square, W.1, March 2.

Protamine Insulin

SIR,—The announcement from four British firms in your last issue that a preparation of protamine zinc insulin of British manufacture will now be available in this country is of great interest to everyone occupied with the treatment of diabetes; it is, however, desirable to emphasize the mild words of warning included in the letter announcing its appearance on the market.

The new insulins have come to stay; their slower action not only enables the physician to reduce the number of daily doses in many cases, but reproduces more exactly the theoretical manner of insulin secretion in health. It is probably on this latter account that so many patients report a considerable improvement in their general feeling of well-being when the new products are employed. But in some instances the change over to one of the new insulins is the herald of a period during which insulin reactions may be frequent and sometimes severe to the point of danger; for this reason the change should only be made when the patient is under close medical supervision, and unless this rule is strictly observed the introduction of the new products may result in major or minor catastrophes liable to mar the record of a most valuable advance in therapeutics.

Having employed protamine insulin for many months I am convinced of its immense value, but I am also familiar with the serious difficulties which must arise when any potent drug is introduced with an action sufficiently slow to carry with it the risks of cumulative effect. When such a substance has the further property of being variable in its potency owing to changes of the amount held in suspension in different conditions, and of being liable to alteration when slightly contaminated by sterilizing fluids, it is clear that considerable care is required in its administration.

For these reasons I feel it necessary to express a warning as well as a welcome in this letter.—I am, etc.,

London, W.1, March 8. T. IZOD BENNETT.

*** A leading article on zinc protamine insulin appears at page 561.—ED., *B.M.J.*

Prostatectomy

SIR,—A measure of heat has developed in the correspondence between Mr. W. K. Irwin and Mr. W. W. Galbraith on the relative merits of certain operative procedures for the removal of the prostate gland. Fortunately a rise of temperature of this kind is never serious; it falls to normal in the subsequent atmosphere of thought and reflection.

The views expressed in Mr. Irwin's original communication, indicating that the two-stage operation for prostatectomy is the method of choice, were followed by a letter from Mr. Galbraith condemning the whole procedure and strongly advocating the Harris technique. Surely we should not be wedded to any one ritual in dealing with the diverse problems which arise in the average case of prostatic obstruction. Each case requires the detached and impartial consideration that experience dictates. Furthermore, the type of operation should vary in accordance with the surroundings. In a propitious atmosphere, where the pre-operative and post-operative treatment can be carried out under good conditions, the Harris operation, or its predecessors, as described by Thomson-Walker and Judd, may be adopted without misgiving: assuming, of course, that nothing in the patient's condition precludes operations of this type.

The operation must of necessity sometimes be performed under adverse conditions, and then the two-stage method is one of the best. Those who perform the Harris operation should in justice to the memory of a great surgeon insist upon the detailed precautions originally described. I allude to the pre-operative and post-operative care. Mr. Galbraith has referred to them, but their importance may be overlooked. From Harris's insistence upon scientific treatment before and after operation and the necessity for care and judgement in the general management of the case we may infer that he was one of those who considered the term "operating surgeon" as obnoxious, and that he realized the fundamental distinction which often exists between first-class operators and first-class surgeons. Harris was by no means a mere technician; he was what Wilkie alludes to as an "operating physician," a term which accurately signifies the line of modern thought.

I think the following words of Harris illustrate what I desire to convey. "The most careful aseptic and antiseptic ritual must be observed in the case of the indwelling catheter. Any slovenliness in this regard, apart from any immediate ill effects, will reap its own harvest of post-operative septic sequelae." And again: "The method so often seen of allowing the open end of the catheter to drain into a urinal between the patient's thighs is fraught with danger, and should no longer be tolerated." I venture to say that Mr. Irwin is not on solid ground in his wholesale condemnation of the indwelling catheter. Everyone recognizes its drawbacks. He says it is to some patients an instrument of torture and to all a method of treatment conducive to sepsis. I have recently (*Practitioner*, March, 1937, p. 284 et seq.) described the methods by which torture and sepsis can be avoided.

In referring to the Harris operation Mr. Galbraith says it is not the method for the occasional prostatectomist, as considerable experience in bladder surgery is essential and not a little skill. I am disposed to take another view. The operation appeals to those who are accustomed to deal with difficult plastic operations on the bile ducts, to those who repair cleft palates and perform the many plastic procedures with which the general surgeon is confronted as a daily routine. I congratulate Mr. Galbraith on his results following the Harris operation. He says: "After the plastic operation (Harris) the vast majority of the patients micturate naturally after the withdrawal of the urethral catheter on the tenth post-operative day." He invites readers of the *British Medical Journal* to see the operation performed by a surgeon experienced in the correct Harris technique, and the smooth, comfortable, and speedy convalescence which follows. I have seen many Harris operations performed by experts, but the results, although sometimes beyond reproach, were by no means as satisfactory as Mr. Galbraith portrays. On the other hand, Mr. Irwin is particularly unfortunate in judging results by a case with a swollen penis, pus dribbling from the urethral meatus, and urine leaking from the suprapubic wound.

I have had the privilege of watching the work of many of those who have studied intensively the problems of prostatic obstruction. These included Freyer, Thomson-Walker, Judd, Squier, Bumpus, and many Continental observers. I have seen also the methods adopted by a younger generation in London and in the great surgical centres in the provinces. As a result of this and a long experience I vary the operation of prostatectomy to suit, to the best of my judgement, each individual case. The facilities for proper pre-operative and post-operative care are often the deciding factor. In most cases I plan the operation so that a clear view can be obtained of the prostatic bed. This is a point against the two-stage procedure. I fear the first stage of this last operation in bad risk cases, unless slow decompression is secured by means of the catheter or by a suprapubic tube introduced with the aid of one of Kidd's appliances. To the suprapubic tube a glass dripper is attached. (Mr. Irwin draws attention to the necessity for such precautions.) When the gland is removed and the cavity visualized it may be obvious that the wisest course is to leave well alone. It may be advisable to secure a spouting vessel, and it is nearly always desirable to clear the area of tags and debris. On the other hand, a plastic operation of the Harris type may be the ideal. Unless speed is essential the walls of the bladder are closed layer by layer, just as in intestinal suture. For ten years I have employed open suction drainage as a routine when primary closure was contraindicated. Open suction is a simple means of keeping the patient dry and clean. It is difficult to prove, but I am convinced that suction has diminished the incidence of post-operative haemorrhage.

I have not adopted the Harris operation with the same enthusiasm as some of my friends and colleagues for two reasons. In the first place I sometimes fear the very complications which Harris was able to eliminate—haemorrhage and sepsis—in the absence of a suprapubic drain. Unless there is unremitting vigilance after operation and personal attention is given with unceasing regularity these disasters may occur. It is not always possible to fulfil these conditions. Furthermore, the boomerang needle does not appeal to me. In discussing needles with Harris he told me he had experimented with many others, but I doubt if the various forms of cleft palate needles and holders have had a fair trial.

Mr. Galbraith reasonably raises the question of multiple anaesthetics in a many-stage procedure. Local anaesthesia, however, is the ideal for suprapubic cystotomy. After infiltration of the tissues in the middle line and exposure of the bladder the wall of the latter is infiltrated through a fine needle and the tube is painlessly introduced.

Is there not a danger that we are losing our sense of proportion and judgement as regards the operation of prostatectomy? We lost it when Lane was treating every fracture with plates and screws with admirable skill; we lost it more recently in the surgical treatment of peptic ulcers. Advocates of the two-stage operation, converts to the Harris method, and those who favour almost exclusively endoscopic resection, are equally convinced they have reached Utopia. All are surprised to find there is more than one main road. The whole history of surgical progress suggests balanced judgement, conservatism in forming conclusions, and the avoidance of dogmatic assertion. A fellow countryman practising medicine once told me he had found by experience that the surgeon who was never in doubt was invariably wrong!—I am, etc.,

London, W.1, March 6. W. I. DE C. WHEELER.

Psychological Factors in Rheumatism

SIR,—In the exuberance of his attack on Dr. J. L. Halliday, Dr. James Cook has overlooked the fact that he is in complete agreement with Dr. Halliday so far as the latter's main thesis is concerned. In all the valuable papers which Dr. Halliday has contributed to the *Journal* his principal theme has been to point out that many patients alleged to be suffering from physically determined disease are in fact the subjects of mentally determined conditions. I gather that this is Dr. Cook's view also. The difference between their views rests on the fact that one of them thinks that malingering is common, while the other would give weight to unconscious factors in many cases; but it is no more hazardous to correlate rheumatism with misfortune than it is with malingering.

It is not surprising that these different outlooks should exist, for one of these observers draws his conclusions from a prison population and the other from people living in freedom. It is true that the inmates of a prison do not differ very much from the rest of us as regards their essential make-up, but their environment is quite different from ours, and I fancy that if we found ourselves in that environment many of us would be tempted to make the most of any ailments we had.

It is true that Dr. Cook does not mention the word "malingering," nor does he say explicitly that his treatment was punitive, for these are dangerous words to use; but unless he implied them all that he says about prisoners is meaningless. It is regrettable that he does not tell us whether he used the methods of isolation, purgation, and buttermilk diet in the treatment of rheumatic patients in his outside practice, seeing that he had so many cases, and as he had so splendid a panacea for the prisoners he must have devised something as useful for those outside; but he says nothing about them.

I wonder whether Dr. Cook ever considered that some of his prisoners, even after his strict examination, may in fact have suffered from physically determined pain, but

that after one course of his treatment they thought it wiser never to complain to him again about any symptom. To silence a patient is not always to cure him. A prisoner knows he has no redress in the matter of an internal scourging which leaves no marks that might be shown to visiting justices. These are not pleasant thoughts; it is in truth very unpleasant when doctors in official positions let themselves become the people who mete out punishment.

I do not agree that Dr. Halliday seems to claim to have discovered anything new. To me it seems that he is calling attention to something well known which is being neglected.

On one point I am in full agreement with Dr. Cook. I hope he will remain guarded about psycho-analysis and not attempt to use its methods. But that is not because I think that those who do so are necessarily "as queer as their patients."—I am, etc.,

London, W.1, March 6. T. A. ROSS.

The Maudsley Hospital

SIR,—Your leading article (*Journal*, March 6, p. 507) on the organization of the Maudsley Hospital with its unrivalled sources of clinical material records Dr. Mapother's opinion that it will be found necessary here, as in the rest of the civilized world, to affiliate psychiatric clinics with teaching hospitals. This is a policy which no one who is interested in general as well as psychological medicine could fail to endorse, but it should be pointed out that there are two types of affiliation among the clinics abroad. The more usual type of liaison is of very intimate nature, and the psychiatric clinic is in fact part of the general hospital, and stands if possible in the same grounds. This has advantages over mere affiliation: advantages not only of mere proximity of the resources of one to the other, but advantages which derive from the identification of the psychiatric clinic with the general hospital.

Professor D. K. Henderson of Edinburgh recently pointed out that the time is passing when it should be necessary for patients to be admitted to a mental hospital on different terms from those on which they are admitted to general hospitals, and admission should be as free to the one place as to the other. Very much the most likely way of bringing this about is that psychiatric clinics should be as necessary a part of the general hospital as a children's clinic or a maternity ward is now. There are clearly other advantages from the patient's point of view in being in a general hospital with all its facilities for investigation and treatment. From the aspect of medical education the advantages are equally obvious. From the scientific standpoint it is in a close association of this kind that the hope lies of raising psychological medicine in this country to the Continental and American standards.—I am, etc.,

London, N.W.1, March 8. R. D. GILLESPIE.

Large Renal Calculi

SIR,—In the *Journal* of February 20 (p. 387) Mr. D. J. Harries gave an interesting account of a large renal calculus he removed and a list of large calculi that have been removed in the past. It is of interest to know that Mr. Hurry Fenwick removed a large renal calculus and several smaller ones from a man in Leicester in 1887. When dry, the single large calculus weighed 26 oz. The patient lived for eight years after the operation. I do not think Mr. Hurry Fenwick published this case as no mention of it is made in any list. The calculus was kept by the patient, and many years later it was given to me by his daughter-in-law. It is now in the Museum of the Royal College of Surgeons. Roughly speaking, it is the size and shape of a guinea-pig. This calculus should be included in the list of such cases.—I am, etc.,

Evercreech, Somerset, Feb. 25. DESBOROUGH BRODIE.

Puerperal Inversion of Uterus

SIR,—I was greatly interested to read in the *Journal* of January 30 (p. 220) of a case of acute puerperal inversion.

In my practice as a medical missionary in Northern Rhodesia I was called, in December, 1933, to see a patient—an African native woman of 19 years of age. Eight hours before I saw her she had been delivered of a 6 lb. male child; this was her second baby, her first being 18 months of age. I strongly suspected that the placenta had been delivered by traction on the cord, although the native midwife strenuously denied this, rather too strenuously in my opinion.

When I saw the patient she was suffering from a very mild degree of shock and from slight haemorrhage. The uterus was completely inverted, the fundus presented outside the vulva, and the cervix was low down in the vagina. That portion of the uterus lying outside the vulva was caked with dust from the mud floor of her hut. Under chloroform anaesthesia the uterus was thoroughly cleansed and well swabbed with iodine, and was then gradually, and with extreme gentleness, reduced. No further treatment was given, and, unfortunately, I was prevented from seeing her on the next day. Forty hours after the operation of reduction I was more than a little surprised to see her standing on my veranda. She had walked twelve miles to thank me for curing her. There were no signs of sepsis, temperature 97.8° F., pulse 72, and the uterus was felt by abdominal palpation to be in the normal position. From the time when the inversion of the uterus had been rectified she had a perfectly normal puerperium. Nine and a half months later she delivered a full-time child, the confinement being in every respect normal.

The most striking points in this case were the comparatively slight amount of haemorrhage and shock and the complete absence of sepsis. Incidentally, in my four and a half years' experience among the natives of Northern Rhodesia I have never come across any puerperal sepsis.—I am, etc.,

T. MORRIS BEVERIDGE, M.B., Ch.B.,
Late of Church of Scotland Mission Hospital, Chitambo, N. Rhodesia.

Edinburgh, March 1st.

Cancer of the Breast

SIR,—I would hesitate to take part in the interesting discussion on the treatment of cancer of the breast appearing in the correspondence columns of the *Journal* did I not feel that the dust of battle was obscuring at least two important considerations which should receive attention in any discussion of this important subject. I refer to the fear of the surgeon's knife and the horror that many women entertain of the mutilation ablation of the breast inflicts upon them. These are two factors that account for much of the regrettable delay in seeking treatment we are accustomed to meet with in these cases, a delay which in the Hamburg census of 1908 was found to average eleven months, and which has apparently not been much reduced since then.

In the last twenty cases operated on for cancer of the breast at the National Temperance Hospital eleven, or 55 per cent., showed involvement of the axillary glands. According to Mr. Sampson Handley this would indicate that in these eleven cases already the internal mammary glands were also involved and the disease had passed beyond the reach of the surgeon's knife alone. Cases therefore continue to reach the surgeon in a very late stage of the disease.

Conceding for the sake of argument that Mr. Sampson Handley's scheme of treatment is the best, is it not possible that this is an occasion when the best is the enemy of the good, and that by constantly insisting on the best we are putting obstacles in the way of our doing the good, which, while falling short of the best, may yet be very good indeed? It seems to me possible that if the radiologist could only obtain in cases of cancer of the breast 50 per cent. of the successful results claimed for surgery in operable cases, his total successful results in cases presenting themselves to him for treatment might considerably exceed the successful results of all cases presenting themselves for surgical treatment. At the present time so many cases are seen so late that neither the surgeon nor the radiologist can hope for success. Were the fear of the knife removed this most regrettable delay might to a great extent be avoided and the hope of successful treatment much increased.

Early operation may offer the best chance of cure; but should we not face the fact that patients are unwilling to come early to the operating surgeon?—I am, etc.,

London, W.8, March 1. HAROLD H. SANGUINETTI.

Ludwig's Angina Treated with Prontosil

SIR,—I read with interest Dr. W. H. Palmer's report in the *Journal* of February 27 (p. 472) on the efficacy of prontosil in a severe case of Ludwig's angina. He remarks on his inability to estimate the value of the method by considering a series of cases so treated; since this line of treatment has in the main been confined to obstetrics it is unlikely that anyone could draw conclusions from a number of cases of cervical cellulitis so treated. Yet what may be lacking in the experience of one man might be gathered from a lumping together of occasional cases if those responsible would trouble to report them. If prontosil or any similar preparation can be relied upon with a high degree of certainty to prove effective in severe septic conditions of a streptococcal nature, such as cervical cellulitis, then we have at our disposal an agent that will relieve the surgeon and conserve the already depleted powers of resistance of the patient by eliminating the necessity for operation, not to mention preservation of the neck from disfiguring scars. Dr. Palmer's letter moved me to report the following case which I treated a month ago.

A man, aged 25, passing through the immediate post-influenzal period, developed an acute alveolar mandibular abscess in the molar region on the left side. The mouth was supposed to be edentulous, but examination showed three root fragments. It was decided that all the fragments should be removed, though only one of them was giving trouble at the time.

This was done under gas and oxygen, and the patient appeared well. No further trouble was anticipated. Four days later I received a somewhat urgent request to see the patient. I found him seriously ill with an extensive cellulitis from the malar process and infra-orbital region to the clavicle on the right side. From the horizontal ramus of the mandible to the thyroid cartilage the neck felt like wood. Externally all anatomical landmarks were obliterated by the swelling and induration. The floor of the mouth appeared to be a mass of sloughing tissue with a foul smell. The tongue was upturned, hard, and fixed, as though carcinomatous. Rigors were experienced; the temperature was 103° F. The case was not a pleasant one, yet immediate incisions and drainage appeared to me the only life-saving measure. At the same time I realized that I might easily lose under the anaesthetic a patient whose recuperative powers had been so violently assailed.

The patient fortunately solved the difficulty. He did not want any more operating. He became highly emotional and hysterical, breaking down and sobbing freely. It was then I decided to wait twenty-four hours longer and try the effect of prontosil. As a matter of fact I used Evans Lescher and Webb's preparation, streptocide. At the same time he had local treatment, which consisted of swabbing with a 2 per cent. solution of mercurochrome, together with a cardiac tonic and free pugation.

By the next day the external appearances were much the same, but I felt that the patient was not quite so ill. He certainly was not worse, so I decided to continue with the streptocide. On the third morning there was a surprising and gratifying change. The temperature had dropped to 100° F., the external swelling was still much the same, but the indurated area was softening. The mouth itself showed a great improvement in that the sloughing was less and the tongue much freer. From this time fairly hot lotions for the mouth were added to the treatment. On the fourth morning the improvement was maintained and was so marked that I felt that the case was likely to recover. From this time the improvement continued steadily. Within eight days the patient was up and about, though there was still a little swelling and induration present under the symphysis and in the submaxillary region with some soreness on pressure along the sterno-mastoid. He made a good and complete recovery.

Since most of these cases are usually streptococcal, and often dental in origin, it would appear a wise thing in the early days or hours of onset to prescribe prontosil or similar preparation freely.—I am, etc.,

Manchester, March 3. H. LYTH.

Physical Training and Pregnancy

SIR,—As the National Advisory Council for Physical Training is now in being I am writing to suggest that the opportunity might be taken to investigate the advisability of suitable exercises for prospective mothers. In a book recently published called *Safe Childbirth* Dr. Kathleen Vaughan indicates that much of the slow and difficult labour of to-day is due to the oval pelvic brim as distinguished from the round brim which she has found in races where childbirth is easy. She believes that suitable exercises will produce a better-shaped brim with more mobile joints. Could not the attention of the National Advisory Council be drawn to this question?—I am, etc.,

London, S.E.19, March 4. M. I. BALFOUR.

"Rachi-resistance" and Spinal Anaesthesia

SIR,—The recent correspondence concerning "rachi-resistance" has been rather interesting. From time to time in informal discussions about spinal anaesthesia I have heard remarks similar to those of Dr. W. R. Black and Mr. G. A. B. Walters (*Journal*, January 30, p. 218). A few anaesthetists, without being aware of the term "rachi-resistance," have said that some of their patients seem to have had a sort of immunity to the effects of spinal anaesthesia. In 1929 and 1930, when we first began to use spinal anaesthesia according to the Pitkin technique as modified by Sise, there were a few failures which were ascribed to idiosyncrasies of the patients. With increasing experience, however, these failures became extremely rare. At the present time there have been approximately 2,500 anaesthesias with spinocain given in the Central Park Clinic, and based on this experience it is the opinion of myself and my associates that failure to produce anaesthesia is due to an error in the technique of administration.

This statement applies only to a complete failure to produce anaesthesia. We have had cases in which a desired level was not reached and in one of these we were able at a later date to demonstrate a partial block in the canal caused by an old fracture. It is more than likely that many partial failures associated with a some-

what bizarre spread of anaesthesia are due to the presence of old adhesions within the canal.

In conclusion, I must agree with Mr. Norman C. Lake (*Journal*, February 6, p. 297) that it is inadvisable to invoke a concept such as "rachi-resistance" to explain a failure to obtain a satisfactory spinal anaesthesia.—I am, etc.,

New York, Feb. 19. JOHN BURKE.

Angioneurotic Oedema of the Tongue

SIR,—Not uncommonly acute swelling of the tongue and lips is caused by drugs of the antipyrine-phenacetin group—in certain people even a very small dose may be responsible.

The first case of the kind I saw was many years ago in an American patient to whom I gave a tablet of the above drugs. Almost immediately the tongue and lips became acutely swollen. The swelling subsided very soon without treatment. The patient allayed my anxiety by telling me that a few years previously in New York the same thing happened after, presumably, a somewhat similar "headache" tablet.—I am, etc.,

London, S.W.1, March 6. REDMOND ROCHE.

Intraperitoneal Haemorrhage from a Graafian Follicle

SIR,—I agree with Mr. Leedham-Green (*Journal*, March 6, p. 527) that this condition deserves better recognition in surgical and gynaecological textbooks in order to save "unnecessary sacrifice of tube and ovary" owing to confusion at operation with primary and secondary ovarian pregnancy.

Even in my short experience I have operated on two of these cases and I have seen two more operated on by Mr. Woolfenden and Mr. Silverstone at the Liverpool Royal Infirmary. These cases simulate acute appendicitis much more closely than an ectopic gestation owing to the absence of vaginal bleeding and a missed menstrual period: hence they are more often referred to a general surgeon than to a gynaecologist. I think this explains why the condition is not stressed in textbooks, because gynaecologists should and usually do write the chapters on the ovary in the general surgical textbooks.

In the four cases I have seen the intraperitoneal haemorrhage was insufficient to cause the signs and symptoms of gross internal haemorrhage such as occurred in Gordon-Taylor's and Klein's cases. In all four the pain started exactly two weeks after the last menstrual period—that is, the time that ovulation is believed to take place; this enabled me strongly to suspect the condition in one case before operation. In three of the cases the pain started as a low constant abdominal pain settling in the right iliac fossa, but in one case rectal pain and tenesmus were the first symptoms, presumably due to the filling of the pouch of Douglas.—I am, etc.,

Liverpool 1, March 7. M. J. BENNETT-JONES.

SIR,—The recent correspondence in the *Journal* on the subject of intraperitoneal haemorrhage from a ruptured Graafian follicle giving rise to symptoms which were mistaken for an "acute abdomen" tempts me to record a case I operated on in September, 1936, which puzzled me a good deal at the time.

A single girl, aged 19, was admitted to hospital on August 25 with a five-days history of pain in the right iliac fossa varying in intensity and pain on micturition. She continued to have pain while in hospital for some days, and urinary investigations were being carried out. On the evening of September 3 she had a sudden acute attack of abdominal pain with marked tenderness and rigidity and hyperaesthesia in the lower part of the abdomen, more particularly on the right side. Rectal examination gave no information. She appeared very ill, and had a raised pulse rate but no rise in temperature. The diagnosis of acute appendicitis was made and an operation decided upon.

At the operation, through a paramedian incision, the appendix was found to be normal and about half a pint of free blood and clot was present in the pouch of Douglas. On examination the right ovary was seen to be congested, and a large Graafian follicle, which was torn across, was bleeding rapidly. The Graafian follicle was cut away and the bleeding area buried by suture with catgut. The appendix was removed and the abdomen closed. Subsequently she developed a urinary infection, which cleared up under treatment.

One month later she was readmitted with further attacks of pain, which her doctor described as being similar to those of right renal colic. Full examination, including cystoscopy and ureteric catheterization, revealed no abnormality. The patient was discharged, and since then has been in good health.

Although I have not seen a similar condition before, I find on inquiry among other surgeons that they have operated on similar cases, and I do not think that the condition can be particularly rare. Fortunately, this particular mistake in diagnosis is not one likely to lead to any permanent harm to the patient, and the appendix can be removed at the operation, always a good prophylactic measure when laparotomy has been carried out and no gross pathological lesion found. In my case I found the haemorrhage could be quite easily controlled by infolding the ruptured "cyst" by suture, and it would seem to be unwarrantable to sacrifice the ovary in most cases of this kind.

My thanks are due to Mr. Denham Pinnock, under whose care this patient was in hospital, for permission to record the case and for helpful criticism and advice.

—I am, etc.,

London, W.1, March 4. J. C. NICHOLSON.

Specific Antitoxins for Gonococcal Infections

SIR,—The treatment of gonorrhoea is too important for me to ignore Dr. Anwyl-Davies's reply to my letter (*Journal*, February 20), and in this respect "practical clinicians" would be the better served if, instead of apportioning praise to the pathologists and others concerned with such scrupulous precision, Dr. Anwyl-Davies would with equal precision elaborate and so clarify his own results.

In my letter I did not ask whether "adjuvant treatment was employed." The term I used was "orthodox treatment," and I stated explicitly what this meant. However, Dr. Anwyl-Davies naïvely admits that some cases were "treated along routine lines"—that is, some cases had (presumably) irrigations and some form of massage—but with a conspicuous lack of precision fails to tell us which type of case had routine treatment and why, and which type of case was denied this and for what reason. To justify his omission Dr. Anwyl-Davies (by implication) compares the routine treatment of gonorrhoea with throat sprays, cardiac stimulants, and skilled nursing in the treatment of diphtheria, and summarily disposes of the matter. He says, "After all, one does not rely on antitoxin in treating a case of diphtheria to the exclusion of throat sprays, cardiac stimulants, and skilled nursing." My reply is—one does. It is in the absence of antitoxin or in its delayed use that cardiac stimulants are chiefly indicated. But this is not the point. If a clinical research were con-

ducted in the treatment of diphtheria and a new therapy used, one would necessarily want to know which cases were cured with the new therapy alone and which needed cardiac stimulants or any other treatment, and why. The cases would then have to be subjected to careful analysis before results of any value could be published. Throat sprays are very comforting; so are bowls of roses. Both are of equal efficacy if one "does not rely on antitoxin" in diphtheria. With reference to skilled nursing, does Dr. Anwyl-Davies imply that some of his cases "having no other treatment" had no skilled nursing? In asking this and other questions I am not indulging in idle persiflage, but am attempting to deal logically not only with the data in his reply but with certain desiderata of paramount importance omitted from it. If my criticism is destructive it is because of my deep interest in gonorrhoeal research in particular, and in scientific method as applied to it.

For an experienced clinician using an entirely new method of treatment to state (and then only after being questioned on the matter) that "some of the cases quoted had no other treatment, others were treated along routine lines," and to leave it at that, reduces clinical research to such depths as to remove it irreparably from the realms of scientific method. Thus with regard to the antitoxin it may or may not possess the value already attached to it. All one can say so far is that the results obtained from its clinical application are meaningless.—I am, etc.,

Enfield, March 6. W. LESTER, M.B., B.S.

Diathermy for Cervicitis

SIR,—In cases of "infective arthritis" investigations to ascertain the focus of infection are made, and usually the tonsils or teeth are blamed. Rarely is the cervix or prostate investigated, yet strangely enough it would appear that these form the commonest site of infection. For many years now, from just after the war, when Dr. C. A. Robinson produced his classic work on the treatment of cervicitis by means of diathermy, the electrical department of one of the large teaching hospitals of London (where his pioneer work was carried out) has been treating large numbers of these cases with unfailing success.

Many members of the profession are unaware of the prevalence of these cases and of the method of treatment, and those who do know of this form of therapy seem to think that it is confined to the treatment of gonorrhoea. This is not so. There appear to be four categories into which cervicitis can be divided: (1) gonococcal; (2) postpartum; (3) menopausal; (4) general. The symptoms of this condition form a syndrome which Robinson worked out as follows: first, vaginal discharge, followed by low backache, depression, toxaemia (bruising easily, etc.), and finally arthritis. On examination the backache can be produced and made more severe by pushing the cervix upwards, but not by putting the patient through the movements of the sacro-iliac joints. The speculum shows erosion of the cervix and discharge therefrom in varying degree according to the length of duration of the infection.

Treatment by means of general pelvic and cervical diathermy twice weekly for about three months is usually sufficient to clear up this infection entirely. Over a period of many years it has been found that this prolonged treatment is more certain than the more rapid methods of cauterization or coagulation. I have been treating large numbers of these patients for some years now, and I feel from the results that a letter on this condition and its treatment is not untimely.—I am, etc.,

London, W.1, March 5. ROBERT LEAVER.

Prevention of Silicosis

SIR,—I ought to answer Mr. McLachlan's queries in your issue of February 13 (p. 361) concerning evidence as to the adsorptive action of coal dust.

If a few grammes of coal dust in a boiling-tube are just wetted with alcohol and then well shaken up with, say, 15 c.cm. of a concentrated ruby solution of iodine in water, the solution will rapidly be almost completely decolorized (cf. Davis, 1911; Rideal, 1926), the iodine being adsorbed by the coal dust particles. Soot will adsorb iodine in the same way, and both coal dust and soot will decolorize industrial methylated spirit by adsorbing the methyl-violet dye. I first observed this adsorptive effect in 1924, and silica dust would probably behave similarly, though I have not yet tried it. This might help to indicate to Dr. Craddock how iodine may be introduced into the lungs, in connexion with his letter in your issue of February 20.

Recapitulating this adsorption of iodine by coal dust, and combining it with Dr. J. Goodfellow's experiments with iodine, described in your issue of February 6, a definite procedure becomes outlined whereby the value, or otherwise, of iodine application as a preventive of silicosis may be ascertained. This is as follows:

(*a*) Some coal mine, or mines, where silicosis is most prevalent—for example, South Wales anthracite mines—should be chosen for experiments.

(*b*) In a circumscribed portion of the workings the atmosphere should be persistently and consistently sprayed with an atomized solution of iodine, so that iodine would be available for adsorption by the dispersed coal and other particles before they passed into the lungs.

(*c*) The dispersed dust should be periodically collected, studied, and analysed to ascertain that iodine is being adsorbed by the particles.

(*d*) Examination should be made and records should be kept of the incidence of silicosis among workers chiefly or wholly engaged in the circumscribed region, as compared with its incidence among other workers immune from iodine spraying. Spraying should be generalized immediately if positive benefits were detected.

The introduction of iodine, since it would freshen the air and give it a sea tang, would hardly be resented by workers; valuable results might be obtained relatively quickly; and if a positive advantage were realized iodization of all coal mines and other industries subject to silicosis could quickly follow. Thus silicosis might be stamped out long before the general prevention of dust formation is achieved and many lives might be thus saved.

Since iodine is very volatile it might be found preferable, to prevent over-moistening the atmosphere, to merely volatilize it into the atmosphere, if the vapour were found to be readily adsorbed, extent of vaporization being controlled by the temperature of the iodine. Whatever silicosis theory were proved or disproved is, of course, of quite incidental importance beside the necessity of relieving sufferers, and such bodies as the King Edward VII Welsh National Memorial Association, the South Wales Miners' Federation, or the Health Advisory Committee of the Mines Department ought surely to be keen to have carried out such a positive, possibly preventive, and relatively simple research.

In fact, it might be better to institute similar research at once in all silicosis-producing industries, in view of wide national and current Parliamentary interest in silicosis and the urgency of the problem, either through the Home Office or the Department of Scientific and Industrial Research.—I am, etc.,

Leeds, March 1. S. C. BLACKTIN.

REFERENCES

Davis (1911). *J. chem. Soc.*, **41**, 1666.
Rideal (1926). *Surface Chemistry*, Cambridge University Press.

Inhalational Therapy

SIR,—The correspondence on inhalational therapy has interested me by reason of a recent experience of the Duke-Fingard treatment. The history of events is as follows:

After answering an advertisement in a Sunday paper my patient went to London. The treatment and apparatus required were described to him and he was referred for examination to a medical man, who wrote to me on November 11, 1936. Prior to the London visit my patient had not informed me of his intentions, but between his return and the receipt of the doctor's letter on November 12 the patient sent for me to explain what was to happen. He had bought a machine, but, owing to pressure on production, it was not yet installed in his house. The machine, he informed me, was somewhat costly, but the charge for the machine included no recompense to Mr. Fingard, and it was left to the patient to make a payment of an unstated amount after he had received benefit from the treatment. At the same time he heard of a celebrated film star who had been cured by the treatment, and of a payment of a thousand pounds. The medicaments cost my patient between £2 and £3 a week.

He started treatment in November and soon became able to spend the whole of the night in a medicated atmosphere. He began to feel much improved in health, the cough and expectoration being much diminished. He was able to sleep and his capacity for exertion increased.

I visited the house some two or three weeks after treatment began and had a demonstration of the method. Personally I did not find the vapour pleasant-smelling, and I took a considerable odour home with me. The vapour was not irritating, but was capable of removing the finish from all furniture and woodwork with which it came in contact. As the vapours pervaded the whole of the house these effects were not limited to the bedroom in which treatment was provided.

On January 19, 1937, I was called to see the patient, who had contracted an acute bronchitis, diffuse and deep-seated. For two days he was able to expectorate some muco-purulent sputum, but then, in spite of stimulant expectorants, he became less and less capable of clearing his chest, and died on January 22, 1937. From previous experience of my patient I should have said he was likely to live another fifteen years.

I think it is important to record instances of this kind when a correspondent (*Journal*, February 13, p. 360), mentioning his experience of the treatment, writes: "I have not seen any ill effects even after a prolonged inhalation of this vapour." My conclusion is that it is unsafe for a patient to spend his nights in such a warm, medicated atmosphere and to go out by day into the rigours of our climate.—I am, etc.,

Runcorn, March 2. N. A. BOSWELL.

Hire Purchase Research

SIR,—I have read with much interest your article under the heading "A Disclaimer" in the *British Medical Journal* of February 13, as my society, the London and Counties Medical Protection Society, has for a considerable period dealt with a number of complaints by its members against the Consolidated World Research Society Ltd. Not only has it advised such members to discontinue subscriptions to the Consolidated World Research Society Ltd., but has offered to defend them should proceedings be brought, and in collaboration with its solicitors has repeatedly invited the Consolidated World Research Society to take proceedings, but in no instance has this challenge been accepted. This challenge is still outstanding, and will be accepted whole-heartedly should the opportunity occur.—I am, etc.,

C. M. FEGEN,
London, W.C.2, March 2. Secretary.

Obituary

ARCHIBALD FAIRLIE, M.D.

Late President, North of England Branch, B.M.A.

We regret to record the death on February 28 of Dr. Archibald Fairlie of Blyth at the age of 72 after a very short illness. Born at Killearn he received his education in the University of Glasgow, graduating M.A., M.B., C.M. in 1889 and proceeding M.D. in 1900. His first appointments included those of resident assistant to the Western Infirmary and house-surgeon to the maternity hospital in that city. Later he was assistant in a practice at Dunfermline and went to Bebside in 1894, adding to the latter extended professional work in Blyth from 1908 onwards. He was also medical officer to the Thomas Knight Memorial Hospital at Blyth and a trustee and a member of its general committee, taking a prominent part in the expansion and reorganization of the hospital a few years ago. For many years he had been chairman of the Bebside Nursing Association. His long-continued and devoted work on behalf of the St. John Ambulance Association led to his being created a Serving Brother of the Order of St. John of Jerusalem.

Dr. Fairlie was elected a member of the British Medical Association in 1895, and was chairman of the Blyth Division from 1927 to 1928. He was president of the North of England Branch from 1933 to 1934, and during this period his son, Dr. C. F. Fairlie, was elected chairman of the Blyth Division, a coincidence which is probably of very rare occurrence, if not unique. Dr. A. Fairlie had represented the Blyth and Morpeth Divisions at two recent annual meetings of the British Medical Association. He was a founder member and a past-president of the Blyth Rotary Club, a member of the Whitley Bay St. Andrew's Society and of the Blyth Literature and Scientific Society, and a Freemason. He was noted as an authority on Scottish Border and Roman history, and took an active part in the proceedings of the Newcastle Society of Antiquaries. He devoted much time to public life—he was a justice of the peace and had been a representative of the Bebside ward on Blyth Urban Council. His wife died eighteen years ago, and he is survived by two sons, both of whom are in the medical profession.

A colleague (W. C. L.) writes: Dr. Fairlie was known and respected by all for his honesty of purpose and equally honest and faithful conduct towards his fellow practitioners and fellow citizens. He won the respect and confidence of all who came into contact with him by his thoughtful appreciation of their problems, his astonishing grasp of detail, his careful marshalling of facts, and his practical opinions on men and matters. He never hesitated to give of his talents and his time to the welfare of the community. He had a high sense of his duty as a citizen, and his death has inflicted a great loss on the medical profession. He was keenly interested in medicine, took an active part in the work of the British Medical Association, and gave freely of his time to the betterment of professional practice. On the scientific side of medicine he was equally keen, and his work was invariably sound and accurate. He was quick to learn and adopt new and useful methods of treatment. Great indeed is the sense of personal loss among those of his fellow practitioners who came into contact with him.

Dr. Theodore Craig writes: By the death of Archibald Fairlie, Blyth has lost its oldest, most erudite, and generally

beloved physician. His was essentially a scholarly mind with a fund of knowledge on innumerable subjects apart from medicine and surgery. Always a shy and unassuming gentleman Fairlie never sought honour or advertisement, yet no doctor in Northumberland has been the recipient of more honours than he. An extraordinarily lovable man, who enjoyed the trust of his patients and the esteem of all his colleagues, Fairlie was never in a hurry, never flustered, and never in the least degree irritable, yet he contrived to discharge the duties of a busy general practitioner with the utmost efficiency and still found time to interest himself in a myriad outside directions. I think he was the most unselfish doctor that I have ever known, generous to a degree. He was associated with every charitable and benevolent work in the Blyth area, but only the recipients of his charity were aware of his good works. Some fifteen years ago the whole of the doctors in Northumberland and Durham combined to present Professor Rutherford Morison with a portrait in oils as a mark of our general esteem. Rutherford Morison is still with us and still carrying on good work in his evening hours, but at the presentation meeting he was visibly affected by the affection and esteem shown by his fellow practitioners. He looked around the great hall of the Durham Medical College trying to find words to express his feelings, and he happened to see Fairlie. He said how deeply he felt the honour which we had done him, and then added: "I am glad to see my old friend Fairlie with us to-day. We of the staff of the Newcastle Infirmary always feel that when Fairlie sends us a patient we have to put on our 'thinking-caps.' Fairlie never sends a patient to the Infirmary unless he feels that our best efforts are required; and his diagnosis is always correct." Mention must be made of his unfailing work for the British Medical Association and for the Northumberland Local Medical and Panel Committee. He rarely missed a meeting and very rarely spoke, but when he did express an opinion it was backed by a mass of real knowledge which was invaluable to his colleagues. His presidential address to the Newcastle and Northern Counties Medical Society last year was a masterpiece of carefully compiled facts and figures concerning the origin and development of the voluntary hospitals. This lecture is carefully preserved in the archives of the society and will be most valuable to us as a ready source of exact information upon voluntary hospital matters.

The late Dr. ROBERT JAMES DICK of Morven, Dartford Road, Sevenoaks, was born on December 15, 1875, at Dunbar, East Lothian, son of a schoolmaster. He was educated at George Watson's School, Edinburgh, and Edinburgh University, and graduated M.B., Ch.B. in 1898, proceeding M.D. in 1910. He came south after qualifying, and a few years later settled at Sevenoaks. In 1917–18 he served with the R.A.M.C. on a hospital train in France. In May, 1936, his health broke down, and he passed peacefully away on February 23 at Nuffield House, Guy's Hospital, after a long illness. He leaves a widow, one daughter, and two sons. The following appreciation has been written by a colleague, Dr. J. Finlay Alexander: Robert James Dick's first introduction to Sevenoaks, where he practised for over thirty-five years, came through acting as locum there. When a partner was wanted in the firm which he eventually joined the doctor for whom he had worked introduced Dick. This, I think, shows the kindly feeling that his colleagues had for him, and it has existed ever since he came to the neighbourhood. He was on friendly terms with all of them, and his opinion on controversial matters was always listened to with the attention it deserved. He formed his opinions after consideration and thought, and when he had made up his mind he stuck to them. This same consideration was also a characteristic of his work. He gave much thought to his cases, and when he had any patient seriously ill this was reflected in his worried mood. He was as careful and unhurried with his poorer patients as with the more affluent, and he was respected and loved by them. Many could tell tales of the trouble he took over details of their illnesses and the kindness which they received. He was a reader and interested in music, and had a great love of beautiful country. His holiday was preferably taken in some out-of-the-way village, and remained a joy to him throughout the year; and his dry humour made him acceptable, whether he went north or south. His long illness he bore patiently, and his friends will feel glad for his sake that the end came suddenly and unexpectedly, at a time when he was less worried about his illness and in a cheerful frame of mind.

The following well-known foreign medical men have recently died: Dr. OSKAR KLOTZ, professor of pathology and bacteriology at the Toronto University Faculty of Medicine, aged 58; Dr. WILLIAMS MCKIM MARRIOTT, dean and professor of research medicine at the University of California Medical School and author of a work on infant nutrition, aged 51.

Universities and Colleges

UNIVERSITY OF OXFORD

Congregation on March 2 approved a decree proposed by Sir Farquhar Buzzard, Regius Professor of Medicine, authorizing a special allowance of £500 a year to any Nuffield professor who undertakes not to retain fees accruing to him by reason of attendance on patients in hospitals associated with the Nuffield scheme. Sir Farquhar Buzzard explained that the object was to permit any professor who did not wish to practise for gain to compound for any fees for this annual payment. His service would naturally be at the disposal of patients and colleagues in cases of special interest.

An election of two members of the Board of the Faculty of Medicine, vice Mr. H. S. Souttar and Dr. O. L. V. S. de Wesselow, will be held on June 2; the members elected will come into office on the first day of Michaelmas Term, 1937, and will hold office for two years. The General Medical Electorate consists of all Oxford graduates in medicine who are members of Convocation. The Board of the Faculty of Medicine includes four members elected by the General Medical Electorate, who must be members of that body, and of whom three at least must be persons engaged in teaching one or more of the clinical subjects of the Faculty. Nominations of duly qualified candidates for election will be received by the Secretary of Faculties at the University Registry up to 10 a.m. on May 12. Each nomination must be signed by six members of the General Medical Electorate, and no candidate will be eligible whose nomination has not been received by that date.

Congregations will be held for the purpose of granting graces and conferring degrees on the following days at 2.30 p.m.: Thursday, April 29; Saturday, June 5; Thursday, June 24; Saturday, July 17; Saturday, July 31. Names of candidates must be entered at the University Registry, Clarendon Building, Broad Street, not later than noon of the second day before the degree day.

H. M. Sinclair, M.A., B.M., B.Sc., Lecturer in Physiology and Biochemistry in University College, has been elected to a Fellowship on the foundation of Dr. John Radcliffe.

In our advertisement columns this week the University of Oxford invites applications for the whole-time post of Assistant Director of Pathology under Lord Nuffield's benefaction. The stipend offered is £1,000 a year and the work must be carried out at Radcliffe Infirmary. Applications should reach the Secretary of Faculties, University Registry, Oxford, by April 26.

UNIVERSITY OF CAMBRIDGE

Edgar Douglas Adrian, M.D., F.R.C.P., F.R.S., Fellow of Trinity College, has been elected to succeed Sir Joseph Barcroft, F.R.S., in the Chair of Physiology from October 1.

Dr. Adrian was awarded the Nobel Prize for Medicine in 1932, and has been Gedge Prizeman, Raymond Horton-Smith Prizeman, and Foulerton Research Professor of the Royal Society.

W. H. G. Jessop and J. W. S. H. Lindahl have been examined and approved for the degree of M.Chir.

During the month of February the title of the degree of M.D. was conferred by diploma on Mrs. A. M. Stewart (Girton); that of M.B. on M. Ball (Newnham); and that of B.Chir. on M. E. Barnard (Newnham).

UNIVERSITY OF LONDON

Recognition of Teachers

The following have been recognized as teachers of the University in the subjects indicated in parentheses:

Guy's Hospital Medical School: Mr. C. Lambrinudi (Orthopaedics).

St. Thomas's Hospital Medical School: Dr. T. Anwyl-Davies (Venereal Diseases); Mr. N. R. Barrett and Mr. B. W. Williams (Surgery); Mr. R. K. Bowes, Dr. A. J. Wrigley, and Mr. J. M. Wyatt (Obstetrics and Gynaecology); Mr. W. Rowley Bristow and Mr. George Perkins (Orthopaedics); Dr. G. B. Dowling (Dermatology); Mr. Philip G. Doyne and Dr. G. G. Penman (Ophthalmology); Dr. J. St. C. Elkington, Dr. H. Gardiner-Hill, Dr. Reginald Hilton, and Dr. J. Forest Smith (Medicine); Mr. Geoffrey Fildes (Radiology); Mr. W. A. Mill and Mr. D. F. A. Neilson (Oto-rhino-laryngology); Mr. H. B. Wilson (Anaesthetics).

The Senate on February 17 resolved that the *Addendum to the British Pharmacopoeia* published in 1936 be used at the second examination for medical degrees in and after July, 1938.

Mr. H. J. Nightingale has been appointed governor of the University College of Southampton.

University Medals

The University Medals in Pathology and in Psychological Medicine at the M.D. examination for internal and external students in December, 1936, have been awarded to A. H. T. Robb-Smith (St. Bartholomew's Hospital) and to A. C. Dalzell (King's College Hospital) respectively. The University Medal in Surgery at the M.S. examination for internal and external students in December, 1936, has been awarded to J. B. G. Muir (Middlesex Hospital).

UNIVERSITY COLLEGE

A public lecture on "Blood Groups and Genetics" will be given by Dr. V. Friedenreich of Copenhagen in the Galton Laboratory, University College, Gower Street, W.C., on Wednesday, March 17, at 5.30 p.m., with Professor R. A. Fisher, F.R.S., in the chair. The lecture is open to the public without fee or ticket.

MIDDLESEX HOSPITAL MEDICAL SCHOOL

The University of London invites applications for the S. A. Courtauld Chair of Anatomy tenable at Middlesex Hospital Medical School. The salary will be not less than £1,000 a year, and applications for the post must reach the Academic Registrar, University of London, W.C.1, by April 23.

The Services

HONORARY PHYSICIAN TO THE KING

Major-General G. A. D. Harvey, C.M.G., has been appointed Honorary Physician to the King in succession to Major-General T. S. Coates, C.B., O.B.E., who has retired.

DEATHS IN THE SERVICES

Colonel HARRY ARTHUR LEONARD HOWELL, C.M.G., R.A.M.C. (ret.), died at Lincoln on February 26, aged 69. He was born at Old Brompton, Kent, on December 19, 1867, the son of Major R. Howell, and was educated at Manchester Grammar School and Queen's College, Cork. Entering the Army as surgeon lieutenant on January 29, 1895, after a period of general practice, he became lieutenant-colonel on March 1, 1915, and retired on account of ill-health with the rank of colonel on October 31, 1921. He served with No. 1 General Hospital, Tirah Expedition, 1897–8, and was on plague duty during the Bombay plague, 1900. He was Parkes Memorial Gold Medallist in 1901, and was a writer on military medical history. During the great war he served in France and Italy, being mentioned in dispatches and awarded the C.M.G.

Lieut.-Colonel ARTHUR DE COURCY SCANLAN, R.A.M.C. (retired), died at Hailsham, Sussex, on February 21, aged 76. He was born at Bristol on December 9, 1860, and was educated at Westminster Hospital, where he gained a prize in clinical medicine in 1881. He took the L.S.A. in 1882, the M.R.C.S. in the following year, and the L.R.C.P. in 1898. After filling the posts of house-surgeon at Westminster Hospital and at the Royal Westminster Ophthalmic Hospital, and of clinical assistant at the West End Hospital for Nervous Diseases, he entered the Army as surgeon on January 31, 1885, in which year he gained the Parkes memorial medal for hygiene at Netley. He was on temporary half-pay, on account of ill-health, from March 11, 1896, to January 4, 1897, but attained the rank of lieutenant-colonel after twenty years' service, retiring on September 6, 1905. While on the retired list he was employed at Dorchester in 1905–6, at Woking in 1906–8, and at Guildford in 1909, and for some years after. He had been a member of the British Medical Association for forty-four years.

Medical Notes in Parliament

The Public Health (Drainage of Trade Premises) Bill was read a first time in the House of Lords on March 3 on the motion of Lord Gage. On the same day the Lords read the National Health Insurance Act (Amendment) Bill a third time. On the second reading of the same Bill, which was taken on February 25, Lord Gage explained that it was made necessary through changes of nomenclature introduced by the Pharmacy and Poisons Act, 1933. The Bill would substitute, in the National Health Insurance Act, 1936, words with the object of regularizing contracts made with corporate bodies by the Insurance Committee of each county or county borough for the supply of medicines to insured persons. It would also make clear that such contracts could be entered into in future on the same basis as before the Act of 1936. Lord Gage mentioned the proviso that dispensing must be by or under the direct supervision of qualified pharmacists.

The Divorce (Scotland) Bill was reported to the House of Lords from committee without amendment on March 4. On March 9 the Children and Young Persons (Scotland) Bill and the Merchant Shipping Bill were read a second time.

The House of Commons this week discussed the financial resolution governing the proposed further assistance to the Special Areas. Orders incidental to the establishment of the new systems of government in India and Burma were approved. The Annual Holiday Bill was reported to the House from a Standing Committee on March 3, and on March 4 the Defence Loans Bill was read a third time. The Methylated Spirits (Scotland) Bill was read a second time without debate on March 9. On the same day the report of the Royal Commission on Local Government in the Tyneside Area was presented to Parliament.

Factories Bill in Committee

A Standing Committee of the House of Commons on March 2 resumed consideration of the Factories Bill at Clause 2, which deals with overcrowding. Mr. ELLIS SMITH moved that the provision exempting existing workrooms from the new regulation regarding cubic space per worker should not apply at times when persons were being employed overtime. He said that a subsequent amendment to be moved by the Home Secretary would propose that Home Office inspectors should require the provision of effective and suitable mechanical ventilation. He gathered that until an inspector paid a visit a firm might be able to carry on for months and years under the old standards. Even under these

standards 16,649 firms had been served last year with contravention notices. Under the Home Secretary's amendment it would be possible for young persons between 16 and 18 to work in a room of 250 cubic feet per person for fifty-four hours a week, and it would be possible for girls of 16 to be occupied in such a room for ten and a half hours a day. The deleterious effect would be greater if employees were asked to work above the normal hours in factories under such unhealthy conditions.

Sir JOHN SIMON said that he and his advisers were not satisfied with the form of the proviso exempting from the general obligation to provide cubic space for workers. He did not like the fact that it made possible an indefinite prolongation of the less satisfactory standard, nor did he wish the Bill to leave the committee in a form whereby certain workshops, because they were to be built hereafter, would be on the 400 cubic feet principle, while others, because they already existed, might without any limit of time remain on the lower standard. He would have to confer with representative authorities, and would ask the committee to insert an amendment in the names of Mr. Lloyd and himself on the understanding that during the report stage they would have a plan whereby the 250 cubic feet standard would disappear within a limited number of years. As for the provision proposed by Mr. Ellis Smith, he saw a great difficulty in putting it in. His advisers told him it was not practical to reduce the number of people who worked overtime, for the result would be that those left would work more overtime. Mr. RHYS DAVIES said that the Opposition did not see the difficulty which Sir John Simon apprehended about the number of people employed in a room. Sir ERNEST GRAHAM-LITTLE said that all scientific research demonstrated that movement of air was more important than cubic space, and if the committee laid stress on cubic space it missed the most essential thing. On battleships the sleeping accommodation provided for sailors was 50 cubic feet. That was made possible by effective ventilation. Bacteriological infection spread far more quickly in still air than in moving air, and still air induced fatigue.

Mr. ELLIS SMITH then withdrew his amendment. On the motion of Sir John Simon the committee added words to ensure that the premises in which the lower standard of cubic space was permitted should only be those which had, since the passing of the Bill, been continuously in the same occupation.

Sir JOHN SIMON then secured the adoption of an additional proviso laying down that

"(*a*) If the inspector for the district requires the provision of effective and suitable mechanical ventilation in any such room and the requirement is not complied with, this proviso shall cease to apply to that room, notwithstanding that the said period of five years has not expired; and (*b*) if at the expiration of the said period effective and suitable mechanical ventilation is provided in any such room (whether in pursuance of the inspector's requirement or otherwise) this proviso shall continue to apply to that room so long as such ventilation is provided and maintained."

After a discussion on the provision authorizing the inspector for the district to require the posting in a workroom of a notice specifying the number of persons who might be employed there the clause, as amended, was approved and the committee adjourned.

TEMPERATURE OF WORKROOMS

The committee resumed on March 4, when Clause 3 (temperature) was considered. The clause provided that no method of ventilation should be employed "which resulted in the escape into the air of any fume of such a character and to such an extent as to be likely to be either injurious or offensive to persons employed therein." Mr. GRAHAM WHITE moved to insert words forbidding the escape of any fume likely to affect the purity of the air. He said it was difficult to find words dealing with fumes and gases in the air upon which practical administration could be based. Gases escaping from heating apparatus and so on might be highly dangerous without being in the least offensive. Mr. GEOFFREY LLOYD said the provision in the existing law was to the effect that there must be no interference with the purity of the air in the room and that provision had been deliberately altered. It had probably been put into the 1901 Act from the old-fashioned idea that the amount of carbon dioxide in the room was the measure of the effective purity of the air from the point of view of the individual. Research had proved that to be quite wrong. The fundamental question was not the purity of the air but whether there was anything in the air which was injurious or offensive. The amendment would make it an offence for there to be some mild impurity of a chemical kind only to be detected by chemical instruments and not in the least injurious or offensive.

Mr. GRAHAM WHITE said it would be possible to have an injurious percentage of carbon monoxide in the air without it being offensive. He agreed it was difficult to reach a form of words which would satisfy everybody, and he withdrew the amendment.

Mr. MANDER also withdrew an amendment which sought to remove the restriction to persons who worked seated, in the subsection which provided that a temperature of not less than 60° should be deemed reasonable after the first hour where the work did not involve serious physical effort. Mr. RHYS DAVIES moved to leave out the limitation which restricted the minimum of 60° to time worked after the first hour. He said that this restriction was not in the Factories Bill which had been introduced in 1924. Sir JOHN SIMON said the whole subsection was an experiment. There was no power under the present Act to prescribe standards of temperature by degrees Fahrenheit, and precise limits of temperature would be difficult to lay down at the beginning in some cases. Even in the same industry opinion differed among workpeople on what constituted a suitable temperature. If Parliament insisted that at the moment of opening the factory the temperature must be not less than 60° it was likely to expose people to unreasonably high temperature before work was finished. Mr. Rhys Davies withdrew his amendment.

Mr. MANDER moved to provide that the temperature after the first hour should be recorded in each workroom by "other instruments for recording temperature prescribed by the Secretary of State" as an alternative to the provision of at least one thermometer as laid down by the Bill. Sir JOHN SIMON said that the thermometer meant an instrument for measuring temperature, and the proposed alternative words were unnecessarily elaborate. Mr. Mander then withdrew his amendment and the chairman ruled that this cut out an amendment tabled by Sir Ernest Graham-Little to ensure provision beside the thermometer of "one katathermometer or other similar instrument for testing ventilation and coolness of air."

The clause was then accepted and added to the Bill without amendment.

VENTILATION

On Clause 4 (ventilation) the committee, on the motion of Sir John Simon, amended the wording to lay down that the provision of the circulation of fresh air in each workroom should be suitable as well as effective. Other amendments were negatived after brief discussion.

Mr. SILVERMAN moved to add at the end of the clause: "provided that no mechanical ventilation shall be deemed efficient which does not secure such frequency of complete changes of air in the workroom as the Secretary of State may by order direct." He said there was unanimity among experts that the effectiveness of mechanical ventilation depended in the main on the frequency with which the air in the workroom was completely changed. In aeroplane factories poisonous fumes had been removed by mechanical ventilation which completely changed the air in a room thirty times an hour. Sir JOHN SIMON said the clause already provided that the Home Secretary might by regulations prescribe a standard of adequate ventilation for factories or for any class or description of factory or parts thereof. Sir ERNEST GRAHAM-LITTLE said sufficient attention had not been given to the importance of change of air in a room. To insist on so many changes an hour was not practicable. A far better system could be adopted. A simple instrument in the form

of a thermometer could be used to test the efficiency of the ventilation and the temperature of the air.

Mr. SILVERMAN withdrew his amendment, and Clause 4, as amended, was added to the Bill.

LIGHTING

On Clause 5 (lighting) Mr. CARTLAND moved to add the words after the provision that the Home Secretary could, by regulations "prescribe a standard of sufficient and suitable lighting," enabling the Home Secretary by special regulations to direct that any operation in a factory should be carried on while sufficient natural lighting was available during the day-time. Mr. HAMILTON KERR said the Institute of Industrial Psychology had proved the bad effect of poor lighting on the health and productive capacity of workers in factories. When a worker suffered from headache or eye-strain or had to look too closely at his work he suffered ill effects and his production fell off. The same was true where he had to work with different colours or with various tools which he had to change from time to time.

Sir JOHN SIMON said the committee must consider whether it would be practicable to carry out the amendment. We lived in a country where there was sufficient daylight one day and not sufficient another, and when the day was dull it might be greatly to the advantage of workpeople to turn on the artificial light. In Clause 5, as it stood, the Bill was taking a great step forward. There was not any provision in the factory law at this moment requiring adequate lighting except in certain dangerous trades. That was scandalous. In making a big reform the committee ought not to place on the Home Secretary the duty of making regulations which it would not be easy to enforce. Mr. BUCHANAN asked whether the Home Secretary could not do something to deal with the case of a factory in which one side was light and the other had a windowless wall and some of the employees were against this wall. Provision should be made to deal with cases where there could be ample accommodation in natural daylight if only the employer cared to use it properly. Sir JOHN SIMON said he would look into the matter. His impression was that a little pressure from the factory inspector would meet such a case.

Mr. CARTLAND withdrew his amendment.

On Subsection (3) of Clause 5, which laid down that nothing in the earlier provisions should "be construed as enabling directions to be prescribed or given as to whether artificial lighting is to be produced by electricity, gas, or any other particular means," Mr. RIDLEY moved to leave out the whole subsection. Sir JOHN SIMON said that the Home Secretary under the Bill would be able to require a standard candle power of sufficient and suitable lighting in every part of the factory, but it was no part of the business of the Home Office to say how that lighting was to be produced.

Mr. BROAD said that for most industrial processes where fine work and steadiness of hand were required gas lighting was obsolete. Parliament was contemplating the possibility of having to defend the public against gas attack, and workers in factories might have to work in gas-tight rooms. The only possible illuminant in such conditions was electricity. Mr. BUCHANAN said the use of naked gas lights in joiners' or carpenters' shops was dangerous.

Sir JOHN SIMON said that other parts of the Bill dealt with safety. He suggested to the committee that it should omit from the Bill the references both to gas and electricity and merely to forbid the giving of instructions "as to whether any artificial lighting is to be produced from any particular source of illumination." It could still insist that there should not be a glare of lighting throughout the shop. The committee accepted the amendment.

A discussion then followed on the subsection providing that all glazed windows and skylights of workrooms should be, so far as practicable, kept clean on both the inner and outer surfaces. The committee made some small amendments and the clause as amended was added to the Bill.

The committee then adjourned until March 9.

Respirators and Concentrated Gases

Mr. PARKER, on March 2, asked the Home Secretary what was the rate of rise of pressure across the filter when smokes were present in the area in a concentration of 0.6 gramme per cubic metre and were breathed through a civilian respirator.

Mr. GEOFFREY LLOYD said that the concentration of arsenical gas mentioned in the question was extremely high, and such as could only be produced in quite exceptional circumstances. It was considered that such concentrations were unlikely to be encountered by the general civilian population under ordinary practical conditions, and the question as to the behaviour of the civilian respirator under these hypothetical conditions had therefore no practical significance.

Mr. PARKER also asked the Home Secretary for what period of time the civilian respirator was calculated to give complete protection, respectively, when phosgene was present in the air in a concentration of 10 grammes per cubic metre, and when mustard gas vapour was being given from the ground when the atmospheric temperature was 15° C. and there was no wind.

Mr. LLOYD replied that the concentration of phosgene mentioned was extremely high. Such a concentration would be very difficult to maintain under ordinary practical conditions. It would therefore be misleading to give the period for which the civilian respirator afforded protection against such concentration. The Government was satisfied that this respirator would afford protection against such concentrations as were likely to be encountered by the general civilian population under normal conditions. The civilian respirator would protect the wearer for very long periods against mustard gas vapour under the conditions mentioned.

Cleanliness of Hairdressers' Premises

A Private Bill Committee of the House of Commons on March 8 considered the Southampton Corporation Bill, which seeks powers in one of its clauses to establish a compulsory register of hairdressers' and barbers' premises and to make by-laws for securing the cleanliness of the premises.

Dr. H. C. MAURICE WILLIAMS, medical officer of health for Southampton, said he had inspected a number of hairdressers' and barbers' shops in the town. Generally speaking, the inspection revealed that there were a large number of hairdressers' premises without water supplied to the saloon. In some cases the basins were emptied or drained into buckets, and he had seen premises where hot water was either brought in in a kettle from the living quarters at the rear or boiled on a fire in the saloon. In a number of cases no paper was laid on the head rests of the chairs, and the use of antiseptic solution, particularly in respect of shaving-brushes, was apparently unknown. His inspection of these smaller hairdressers' shops justified his committee in inserting the clause in the Bill. Unless proper precautions were taken with regard to cleanliness and sterilizing there was great danger of spreading disease. Ringworm was undoubtedly spread in a number of cases by barbers' shops. Another disease, impetigo, which was common to children, could also be spread. They had about seven hundred cases in a year, usually among children, but sometimes among adults. In Southampton, where there were a number of Lascars and foreign crews, it was possible that a tropical disease, similar to ringworm but very much more difficult to cure and seldom found in this country, would be spread. There was also the question of vermin. In cross-examination Dr. Williams said that the Bill was mainly aimed at a very small number of poor barbers' shops in the poor part of the town, but even in the better-class hairdressers there was room for improvement.

Mr. ASKEW, on behalf of the Hairdressers' Association, opposing the Bill, said it was not right that the corporation should be given these overriding powers for a large and important trade in the whole of Southampton because there were in one part near the docks one or two shops of the condition described. No system of control or by-laws could prevent a barber having dirty hands. If it was thought proper that there should be some registration or supervision of the activities of hairdressers that was a matter for general legislation. Last

year the Hairdressers' Registration Bill was introduced into Parliament, but it was too late in the session for it to proceed. The Bill would very shortly be reintroduced, and it made provision for the proper supervision and control of these premises.

The committee decided that there was justification locally for the clause, and that, so far as the clause was concerned, the preamble of the Bill was proved.

Health Services in Special Areas.—In a tabulated statement which he furnished to Mr. Batey on March 4 Mr. ERNEST BROWN showed that the Commissioner for Special Areas in England and Wales had entered, up to January 31, 1937, into commitments of £1,519,360 for hospitals, £39,610 for maternity and child welfare services, and £53,250 for district nursing and ambulance services. Expenditure by the Commissioner on the same services in that period had been respectively £23,220, £8,560, and £31,400.

Vitamins Added to Margarine.—Mr. WILLIAM LEACH, on March 4, asked if the Minister of Health was aware that it was the practice of manufacturers of margarine to add cod-liver oil or other oil from fish livers, and to treat with ultra-violet rays or by other means artificially to vitaminize the margarine synthetically under the claim that its food value was then equal or superior to that of summer butter. Sir KINGSLEY WOOD replied that vitamins were added artificially to some brands of margarine. He had no reason to doubt it was possible to make margarine the equivalent of butter in vitamin content. No investigation had been made by experts of his department to decide whether the claims mentioned by Mr. Leach were valid.

Manchester Royal Infirmary and New Labour Exchange.—On March 8 Mr. ECKERSLEY asked the Parliamentary Secretary to the Ministry of Health, as representing the First Commissioner of Works, whether, before the plans for the new labour exchange in Manchester were approved, full consideration would be given to the value to the city of the Robey Street branch of the Manchester Royal Infirmary and to the necessity for ensuring that the new exchange would not interfere with its light or amenities. Lieut.-Colonel MUIRHEAD said he was aware of the position regarding the erection of the new central employment exchange for Manchester. The Minister of Labour and the First Commissioner for Works had discussed the matter with the chairman and other members of the board of the Royal Infirmary. After careful consideration the Minister had decided that the building of the exchange should proceed and the contractors were now working on the site.

Typhoid Fever Outbreak at Liverpool.—On March 8 Mr. GROVES asked the Minister of Health whether any investigation had been made into the milk consumed by the sufferers in the recent outbreak of typhoid at Liverpool; and whether the majority obtained their milk from the same source or from different sources. Sir KINGSLEY WOOD replied that this outbreak had been investigated by officers of the Liverpool City Council. Some 60 per cent. of the persons affected obtained their milk supply from the same retailer, but there was no reason to think that milk was the source of infection in these cases.

Notes in Brief

On March 2 Mr. RUNCIMAN, replying to Mr. T. Williams, said he understood that the rise in the price of glycerin in recent months was due to an expansion of normal industrial demand and that the effect of the Government's rearmament programme on the position could be regarded as negligible.

The number of textile factories in the West Riding in which women and young persons over 16 are employed on a two-shift system is nineteen, and the number of women and young persons so employed is rather over 1,000.

About 90,000 workpeople in England and Wales are covered by agreements providing for holidays with pay.

A Bill to extend the principle of removal of the blind from the administration of the Poor Law is in preparation.

The taking of certain protective measures at the Palace of Westminster against gas and other air attack risks is under consideration.

Medical News

The House of the British Medical Association, including the Library, will be closed for the Easter holiday from 6 p.m. on Thursday, March 25, until 9 a.m. on Tuesday, March 30 (Library 10 a.m.).

Owing to the illness of Professor Georges Portmann the meeting of the Chelsea Clinical Society, arranged for March 16, has been cancelled.

The following members of the medical profession were returned at the London County Council's elections on March 4: Dr. J. A. Gillison (Lab.), Bermondsey, Rotherhithe; Dr. Esther Rickards (Lab.), Greenwich; Dr. B. Homa (Lab.), Hackney, Central; Dr. S. Monckton Copeman (M.R.), Hampstead; Dr. S. W. Jeger (Lab.), Shoreditch; Dr. C. W. Brook (Lab.), Southwark, North; Mr. Somerville Hastings (Lab.), Stepney, Mile End; Dr. Florence B. Lambert (M.R.), Westminster, St. George's.

Dr. A. G. Maitland-Jones and Dr. L. Mandel will open a discussion on "Gastro-enteritis in Children" at a meeting of the Hunterian Society at Simpson's Restaurant, Cheapside, E.C., on Monday, March 15, at 8.30 p.m. The meeting will be preceded by a dinner at 7.15 p.m.

The annual dinner of the Medical Superintendents' Society will be held at the Langham Hotel, London, W., on Saturday, March 20, at 7.30 p.m.

A meeting of the Sussex Association of the Medical Women's Federation will be held at the new Sussex Hospital, Brighton, on Thursday, March 18, at 5.30 p.m., when Dr. Janet Vaughan will read a paper on "The Diagnosis and Treatment of Common Anaemias." Members of the Brighton Division of the British Medical Association are invited to be present and to take part in the subsequent discussion.

The German Society of Balneology and Climatology will hold its spring meeting at Breslau from March 26 to 28.

The fourth International Congress on Leprosy will be held in Cairo on March 21. The first was held in Berlin in 1897, the second in Bergen in 1909, and the third in Strasburg in 1923.

The sixty-first Congress of the German Society for Surgery will be held in Berlin from March 31 to April 3, when papers will be read by K. H. Bauer of Breslau on the progress of experimental research on tumours, the nature and treatment of pseudarthrosis, by G. Magnus of Munich, the surgical importance of vitamins, by A. Fromme of Dresden, and the physiological principles of circulatory collapse, by H. Rein of Göttingen.

The January issue of the *Archives of Dermatology and Syphilology* is dedicated to Dr. William Allen Pusey on the occasion of his retirement from the editorship.

We are asked to state that at the Kaiserin Friedrich-Haus, connected with the Berlin Academy for Post-Graduate Medical Study, there is a bureau of general information which will, gratuitously and with strict impartiality, answer all questions pertaining to matters of interest to physicians. Every foreign practitioner visiting Berlin is urged to get in touch with this information bureau (Auskunftei), Berlin N.W.7, Robert Koch-Platz 7, either by writing or by personal call, so that a plan for the most profitable utilization of the time at his disposal may be drawn up for him. The bureau is also willing to provide letters of introduction to clinics, institutes, etc., in Berlin as well as in other parts of Germany.

During the week ended March 6 the number of deaths ascribed to influenza in the 122 great towns (including London) of England and Wales was 181, compared with 242 in the preceding week. In London the number of deaths from influenza was sixteen, compared with twenty-three in the preceding week. The notifications of pneumonia in London were eighty-five against 101.

The issue of the *Bulletin de l'Office Internationale d'Hygiène Publique* for January contains a report by Professor D. Danielopolu, the delegate of Rumania, and Drs. C. Dimitru and Tanasoca on the problem of rheumatism and diseases of the circulation. A supplement is devoted to papers on the education of backward or abnormal children.

Sir Arthur MacNalty, Chief Medical Officer of the Ministry of Health, referred to the possibility of reducing mortality and sickness among young children at the "toddler stage" in an address delivered at the opening of a new maternity and child welfare centre at Hornsey on March 1. The decline in the rate of infant mortality for England and Wales as a whole had, he said, been a source of satisfaction to all concerned with infant welfare. The success achieved in the reduction of infant mortality gave ground for hope that in due course a corresponding advance might be made in protecting children in the next important stage of life—the "toddler" stage—from those impairments which could be avoided or mitigated by careful supervision. Here continuity of medical supervision, before and after school age was reached, was of much importance, and called for a maximum degree of co-ordination between the maternity and child welfare service and the school medical service.

The Bishop of Birmingham, preaching before the University of Oxford on March 7, said: "The cost of social derelicts, and especially of the feeble-minded, is harmful in that indirectly it presses on all classes. I cannot think it right to keep alive individuals whom doctors know to be doomed from birth to a subhuman existence. A false humanitarianism is at the present time a drag on social progress." Dr. Barnes also said: "It is well to emphasize that the lower middle and artisan classes are the most valuable population reservoir of the country. They replenish the wealthier classes which constantly tend to disappear; and from them come, at an interval of a generation or two, many of the nation's leaders."

In memory of Nicol McNicol Rankin, *M.C.*, M.B., who died in December, 1931, a fund has been opened to commemorate his name in the Central London Throat, Nose and Ear Hospital, with which he was closely associated as a surgeon and a member of the committee of management. Mr. Rankin's interest in and affection for the hospital was very great, and notwithstanding the lapse of time, his work has not been forgotten in the institution he loved so well. A number of friends have therefore inaugurated a fund to provide a permanent memorial, and it is felt that the naming of a cot in the children's ward would be the most appropriate way. Gifts for "The Nicol Rankin Memorial Fund" may be sent to the treasurer, Lord Erskine of Restormel, Central London Throat, Nose and Ear Hospital, Gray's Inn Road, W.C.1.

Dr. T. Madsen, chief of the State Serum Institute in Copenhagen, has again been elected a member of the Health Committee of the League of Nations, and has become for the seventh time its president.

A recent epidemic of approximately 500 cases of scarlet fever in Oswego, Tioga County, New York State, has been traced to the use of raw milk from a cow which had been infected on a farm where there had been three cases of scarlet fever.

It is reported that 142 cases of cerebro-spinal fever have recently occurred in Cyprus, including eighteen in the capital Nicosia, with a mortality of 30 per cent.

Dr. Julius Wagner-Jauregg, professor of psychiatry and neurology at Vienna, celebrated his eightieth birthday on March 7; and Geh. Rat Dr. Emil Abderhalden, professor of physiology and president of the German Academy of Natural Sciences at Halle, celebrated his sixtieth birthday on March 9.

Sterilization has been made legal in the canton of Vaud in Switzerland.

Letters, Notes and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone, unless the contrary be stated. Correspondents who wish notice to be taken of their communications should authenticate them with their names, not necessarily for publication.

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QUERIES AND ANSWERS

Oxaluria

"PERPLEXED" writes: Perhaps some of your readers may be able to suggest a satisfactory method of prophylactic treatment for a woman patient of mine. Urinary calculi form every few months, causing considerable agony until voided. On analysis they consist of calcium oxalate and fibrin. Dieting, with the exclusion of meat, egg-yolk, and certain vegetables, has failed, as have Vichy and Contrexéville waters, to prevent the formation of the calculi.

External Use of Iodine

Dr. J. C. MACAULAY (Northampton) writes in reply to "E. P." (*Journal*, February 27, p. 482): The antiseptics I have in mind as satisfactory are derived from xylenol. There are several preparations by good firms now on the market. I did not mean to convey by my first letter (February 13, p. 374) that iodine was of no use, but that it had certain disadvantages.

Dr. W. R. GROVE (St. Ives) writes: Instead of this unsatisfactory application, for some twenty years I have used a mixture of lysol 2 drachms, with ether 1/2 oz., in surgical spirit to 4 oz. The wound is cleaned with the solution and is then dressed with gauze wrung out in it. The smarting lasts only about a minute and is probably not more than with the iodine. Afterwards it is a comfortable dressing, and where the application has reached the depth of the wound there is no pus formation. Bleeding is stimulated, but the solid mass formed with the blood can be usually left till healing has occurred. In roadside accidents one's own hands can be disinfected with the same solution. Lately I have substituted dettol for lysol in the same quantity, and find it just as satisfactory. The same solution is used for disinfecting instruments and syringes, but in the latter case the syringe is washed out before use with pure spirit or sterile water. As an unashamed Victorian, trained under the carbolic spray, I have never deserted antiseptic for aseptic midwifery, and I use this solution to disinfect the external parts several times during labour, and the inside of a rupture before suture, while my own hands and arms, after the usual ablutions and while still wet, have the same mixture well rubbed in and the examination made while the hands are wet. I have never found my results make me wish I had used gloves. When the hands have been soaked in this way with the lysol preparation a slight roughness will remain for two or three days, but I do not find this happens when dettol has been substituted. I was introduced to this solution at a bacteriological laboratory during the war, where it was used for syringes.

Granuloma Annulare

"H. F. P." writes: Could anybody advise me as to the treatment of a girl aged 8 years suffering from granuloma annulare? *X* rays and various ointments have been tried with only temporary success. It disappears in summer but reappears again each winter and seems to be spreading.

Sequels of Tooth Extraction

"G.P." writes: I am attending a woman who has had a wisdom tooth extracted. Soon afterwards her neck became swollen and very painful; she also complains of facial neuralgia going over head and into ear, with difficulty in opening mouth and swallowing. The breath is extremely offensive. I should be much obliged for suggestions as regards any treatment that would cut short this most distressing condition, which sometimes continues for months, completely incapacitating the patient. The neuralgia is most persistent, comes on when opening the mouth, and wakes the patient after sleeping. Aspirin 15 grains, bromide, and butyl-chloral hydrate and gelsemium have been tried. The latter relieves the neuralgia of the fifth nerve, but not so much the pain spreading from lower jaw into ear and over head.

Income Tax

Estimate of Tax Payable

"M.B., B.CHIR." gives some particulars of his gross earnings and expenses, and asks for an estimate of the amount of income tax payable.

∴ Gross earnings, less common practice expenses		£1,200
Expenses as per list	£330	
Add half local rates	20	
Add half net Schedule A assessment, say.. ..	45	
Running costs of car..	60	455
		£745
Less depreciation allowance..		45
Share of firm's Schedule D assessment		£700
The tax payable on this will be as follows:		
Earned income relief, one-fifth of £700		£140
Personal allowance (married)		180
		£320
Tax payable, therefore, on £700−£320=£380		
On £135 at 1s. 7d. in the £		£10 13 9
On £345 at 4s. 9d. in the £		81 18 9
		£92 12 6
Less life assurance allowance, £39 at 2s. 4½d. in the £		4 12 7
		£87 19 11

As against this tax, however, "M.B., B.Chir." can claim repayment at 4s. 9d. in the £ in respect of the amount of bank interest paid by him in the year; as he can deduct tax on paying interest to the insurance company no similar relief is due for that interest. Tax will also be payable on the Schedule A assessment of his house.

LETTERS, NOTES, ETC.

Wax Solvents

Mr. M. R. SHERIDAN, F.R.C.S.Ed. (Truro) writes: If Dr. G. C. Pether (March 6, p. 529) will turn up page 168 of *The Principles and Practice of Otology*, by Watkyn-Thomas and Yates, published in 1932, he will find there liq. paraffin described and recommended as a solvent of wax in the ear.

Vitamin E

Glaxo Laboratories Ltd. (Greenford, Middlesex) have prepared a useful pamphlet describing the therapeutic uses of this anti-sterility factor. The existence of vitamin E was proved by Evans as early as 1922, but its therapeutic value is only now being discovered. It is a fat-soluble vitamin found in wheat-germ oil, and at present rapid progress is being made in identifying its chemical nature. Female rats deprived of this vitamin grow normally and can conceive, but at a certain stage in pregnancy the foetuses die and are reabsorbed. In male rats the deficiency leads to loss of mobility in the spermatozoa and later to azoospermia. Administration of this vitamin by mouth is proving a successful method in the treatment of women who abort habitually. In 1931 Vogt-Möller reported success in this form of treatment, and during the last two years several favourable reports have appeared based on relatively large numbers of cases. Less attention seems to have been paid to the possibility of treating male sterility, but here also there would appear to be a possible therapeutic application. The ten-year interval between the discovery and the successful clinical use of the vitamin is an interesting point, for it shows how difficult it is to judge at once the ultimate therapeutic importance of a physiological advance.

Sclerosing Submucosal Injection of the Turbinates

Mr. ARTHUR MILLER (London, W.1) writes: Further to the correspondence in the *Journal* (February 13, p. 359, and February 20, p. 416), may I be allowed to state that my respect for the nasal mucosa is such that removal or cauterization of the redundant parts of the turbinates is only resorted to in exceptional cases where there is obvious interference with the drainage of the sinuses, etc. I treat most of these cases by diastolization, thus avoiding any injury to the mucous membrane. The treatment is a somewhat prolonged one (six to eight weeks), but most gratifying. The improvement in nasal breathing is very marked; a number of cases of catarrhal deafness, particularly in children, respond to it very well. Mr. Arthur Wells introduced this treatment in this country in 1926, and I am indebted to him for bringing it to my notice.

New View of Pneumonia

Dr. LAURENCE E. D. KNIGHTS (Cheam, Surrey) writes: The new view of pneumonia presented by Dr. W. A. Marris (*Journal*, February 13, p. 361) will receive wide support. The raised respiratory rate is not due to a reduction of vital capacity; extensive fibroid phthisis leads to no rise in a patient at rest, and high pyrexia from inflammation outside the respiratory tract—for example, pyelitis—but moderately affects pulmonary ventilation. On the other hand, the insidious acute otitis media which characterizes a Group 3 pneumococcus (*Streptococcus mucosus*) infection produces, particularly in children, a "pneumonic" type of respiration when no coexisting pneumonia is present. This always occurs in pneumococcal septicaemia too. In primary pneumococcal peritonitis, almost invariably pelvic, and in arthritis one would not expect, on anatomical grounds, a similar degree of toxic absorption to occur, and I believe that rapid respiration is not a feature in these conditions. I would be interested to know the effect on respiration of a pneumococcal osteomyelitis where ready absorption might be expected. With regard to treatment in general my opinion is: (1) The kaolin poultice is of little value, and its application causes unnecessary handling of the patient; with the gamgee jacket it should become of "historic interest." (2) The pain of pleurisy is far more efficiently eased by strapping the chest in expiration. (3) Digitalis is a general cardiac poison with a specific effect on the bundle of His. Its use in pneumonia should be restricted to patients with fibrillation, and then it should be given with caution: to attempt to allay a toxic tachycardia is as misguided as to reduce the laudable temperature with antipyretics. I have seen its exhibition in straightforward pneumonia cases lead to a fatal termination. (4) The patient should recline in the position of greatest comfort; frequently supine, and not as routine in a sitting position. (5) A recent personal experience of pneumonia made me eternally grateful to the physician for prescribing morphine 1/4 grain (together with strychnine 1/20 grain) six-hourly. The relief to the fevered and poisoned mind must be experienced to be appreciated.

Academic Costume

With reference to the letters by "X. Y. Z." (February 20, p. 430) and Dr. R. R. Prewer (February 27, p. 482) Dr. CLAUDE A. P. TRUMAN of Exford, Somerset, has sent us a list of non-university bodies which grant hoods. He adds: "Some long time ago Oxford University granted to S.M. (students in medicine) and students in law (S.C.L.) a hood of black stuff, lined with blue silk. In addition, the University of Durham grants to L.Theol. and Assoc.Sc. a black stuff hood, faced with velvet and bound with palatinate purple silk. This does not exhaust the list, I think."